COLOR LASER COPIER

SERVICE MANUAL

REVISION 3 SEPT.1989

Canon
FY8-1372-030

CANON COLOR LASER COPIER REV.3 SEP. 1989 PRINTED IN JAPAN

COLOR LASER COPIER
SCANNER

SERVICE
MANUAL

I. SPECIFICATIONS

Type

Main unit	Desk top type
Copyboard	Fixed
Scanning light	Tungsten halogen lamp (150W)
Optical system	Fiber otptic lens array
Image reading	Photosensor CCD array (to produce equivalent electrical signal)

Functions

Types of originals			Sheets, books, 3-dimensional objects (2kg max.)
Max. size of original			A3/Ledger (11″ × 17″)
Possible number of areas for image modification			For framing and blanking: 8 For color conversion and painting: 3 For color mode and color balance: 1
Reproduction ratio	Base		1 : 1 (±0.5%)
	115V	REDUCTION I	1 : 0.647
		REDUCTION II	1 : 0.733
		REDUCTION III	1 : 0.786
		ENLARGEMENT I	1 : 1.214
		ENLARGEMENT II	1 : 1.294
		ENLARGEMENT III	1 : 1.500
	220/240V	REDUCTION I	1 : 0.707
		REDUCTION II	1 : 0.816
		REDUCTION III	1 : 0.865
		ENLARGEMENT I	1 : 1.154
		ENLARGEMENT II	1 : 1.226
		ENLARGEMENT III	1 : 1.414
	Zoom		1 : 0.500 ~ 4.000
Horizontal scanning direction			16 picture elements/mm
Vertical scanning direction			16 lines/mm
Continuous copying			Up to 99 sheets
Option			Film projector, control counter/card unit
Automatic return to standard mode			2 minutes (adjustable)

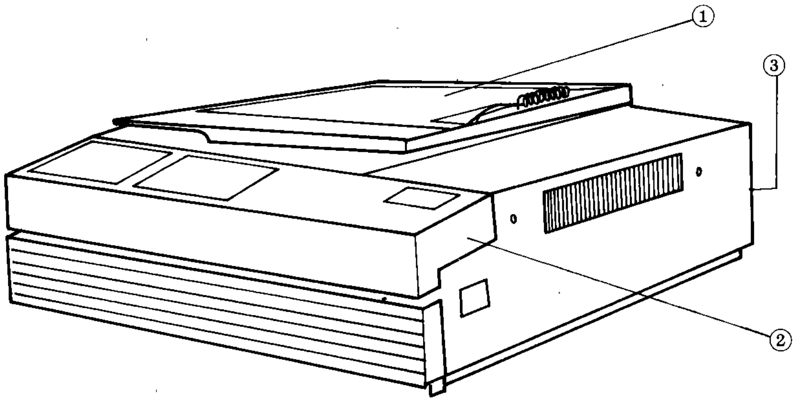
Others

Operating environment	Temperature	15 ~ 30°C* (59-86°F)
	Relative humidity	10 ~ 80%*
	Barometric pressure	0.8 ~ 1 atm
Power Supply (voltage ±10%)		Serial numbers
	115V 60Hz	CGK xxxxx
	220V 50Hz	DGK xxxxx
	240V 50Hz	EGK xxxxx
	240V 50Hz (CA)	FGK xxxxx
	220V 50Hz (FRN)	GGK xxxxx
Power consumption	Max	440W (scanner only)
Dimensions	Width	760 mm (30″)
	Depth	700mm (27.6″)
	Height	249.5 mm (9.8″)
Weight		45kg (100 lb)

*See figure 5-1 in the Printer Service Manual for details.

Information in this manual is subject to change with improvement or redesign of the copier.

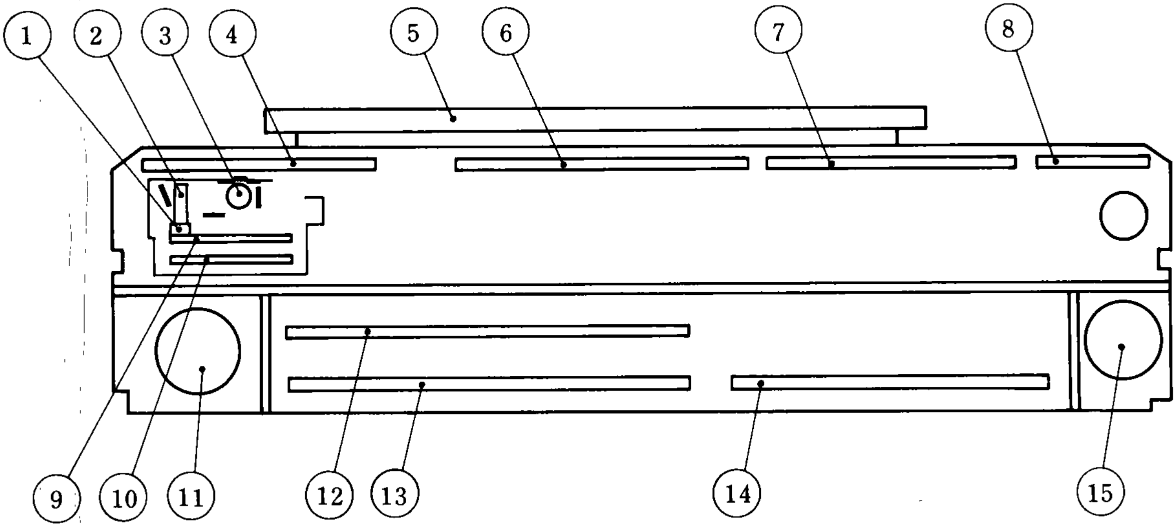
II. PARTS NAMES



① Editor
② Control panel
③ Power switch

Figure 1-1 External view

III. CROSS SECTION DRAWINGS



① CCD	⑨ CCD driver PCB
② Fiber optic lens array	⑩ CCD preamplifier PCB
③ Scanning lamp	⑪ Fan
④ Control panel PCB 1	⑫ CPU PCB
⑤ Editor	⑬ Digital processor PCB
⑥ LCD (Liquid Crystal Display)	⑭ Analog processor PCB
⑦ Control panel PCB 2	⑮ Scanner motor
⑧ LCD power supply PCB	

Figure 1-2 Cross section

I. COLOR REPRODUCTION

To understand the operations of a color copier, it is first necessary to have a basic understanding of light. The following section introduces the properties of light used for color copying.

A. Light

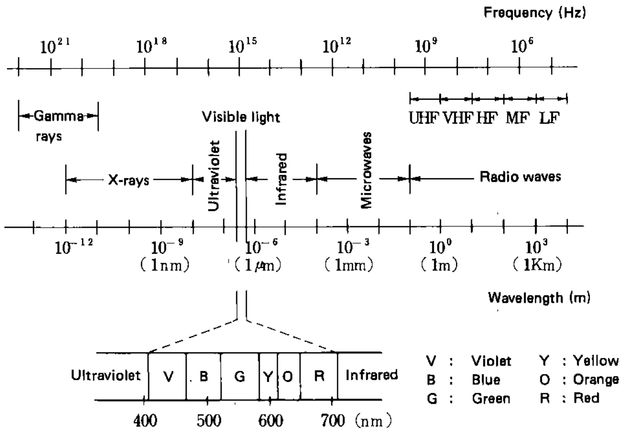

Frequency (Hz)
10^{21}
10^{18}
10^{15}
10^{12}
10^{9}
10^{6}
Gamma rays
Visible light
UHF VHF HF MF LF
X-rays
Ultraviolet
Infrared
Microwaves
Radio waves
10^{-12}
10^{-9} (1nm)
10^{-6} (1μm)
10^{-3} (1mm)
10^{0} (1m)
10^{3} (1Km)
Wavelength (m)
Ultraviolet
V
B
G
Y
O
R
Infrared
400
500
600
700 (nm)
V : Violet
B : Blue
G : Green
Y : Yellow
O : Orange
R : Red

Figure 2-1 Types of electromagnetic radiation

Figure 2-1 shows the types of electromagnetic radiation, classified by frequency.

As the figure shows, the color perceived varies with the frequency of the electromagnetic (light) radiation. Thus, electromagnetic radiation is of wavelength in the range 410 to 450 nm is perceived as violet.

Reference: Wavelength units
1 nm (nanometer) $= 10^{-9}$ m

Visible light (400 to 700 nm) is classified as follows.

Wavelength (nm)	Color
400~500	Blue
500~600	Green
600~700	Red

Table 2-1

Although the main colors are shown with their boundaries clearly drawn in Figure 2-1, the boundaries between colors are actually not so precise.

For example, yellow-green exists between yellow and green, but it extends from yellowish yellow-green to greenish yellow-green, so the distinction between yellow, yellow-green and green is not sharp. Similarly, the range indicated by "green" actually extends from yellow-greenish green to blue-greenish green.

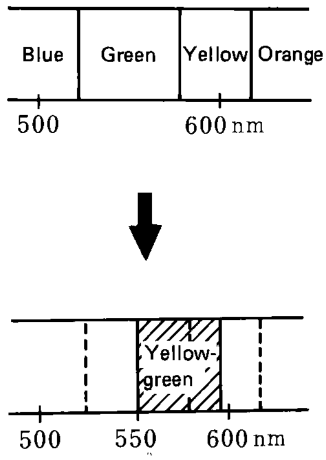
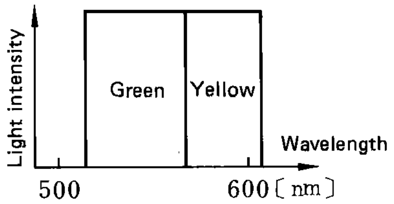

Blue
Green
Yellow
Orange
500
600 nm
Yellow-green
500
550
600 nm

Figure 2-2

Thus, light in the range of wavelengths from about 550 to 600 nm is perceived as yellow-green.

Now, light in the range of wavelengths from about 520 to 610 nm will also be seen as yellow-green.

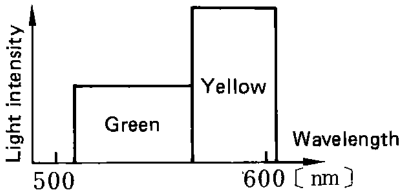


Yellow-green

Figure 2-3

The color of light in the wavelength range from about 520 to 610 nm can be seen as the color of the light of wavelength of approximately 565 nm, around the middle of the range.

That is, in this range of wavelengths range, the way the light is perceived is determined by the proportions of green wavelength light and yellow wavelength light. For example, if the ratio of yellow and green is 1:1, it appears as yellow-green. If the ratio is 2:1, it appears as yellowish yellow-green.



Yellowish yellow-green

Figure 2-4

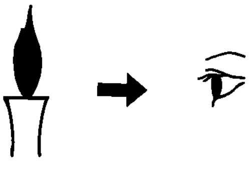
B. Types of Color

Color is generated in the following three ways.

1. Luminous color

This is the color emitted by an object, and is determined by the range of wavelengths the light.

For example, a flame emitting electromagnetic radiation of wavelengths in the range 650 to 700 nm appears to the human eye as "red".



Luminous color

Figure 2-5

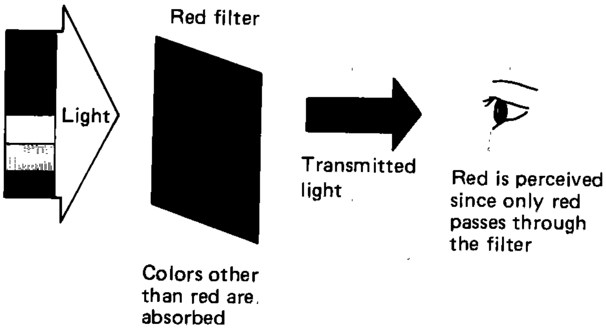
2. Intrinsic color

The color of solid bodies (other than those producing luminous colors) is an intrinsic property of the body. There are two types of intrinsic color, one produced by reflected light, the other by transmitted light.

a. Transmitted color

When light strikes a transparent or translucent body, some wavelengths pass through, and others are stopped. The apparent color of the body is the color of the light that passes through.

For example, a red filter looks red because it transmits only red, and blocks all other colors.



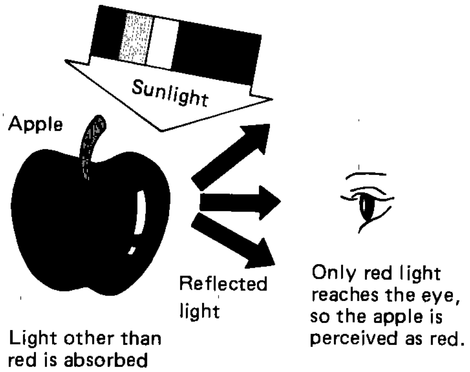
Red filter
Light
Transmitted light
Red is perceived since only red passes through the filter
Colors other than red are absorbed

Figure 2-6

b. Reflected color

When light strikes a body, some wavelengths are reflected and others are stopped. The apparent color of the body is the color of the light that is reflected.

For example, a red apple reflects (mainly) only red light and absorbs all other colors.



Sunlight
Apple
Reflected light
Only red light reaches the eye, so the apple is perceived as red.
Light other than red is absorbed

Figure 2-7

C. Color Mixing

Colors can be produced by mixing three primary colors two ways: additive mixing and subtractive mixing.

1. Additive color mixing

By this method of producing color, transmitted light (or light from luminous sources) of the three primary additive colors blue, green and red, is mixed. This is the method used for color television. The colors are superimposed, so the larger the number of colors that are mixed, the brighter the result appears. If all three primary colors are mixed in the correct proportion, white light is produced.

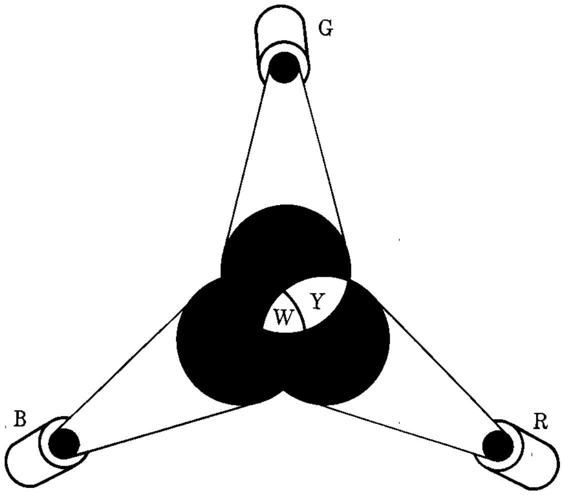


Figure 2-8

2. Subtractive color mixing

a. Introduction

By this method of producing color, the three primary subtractive colors are mixed: yellow, magenta and cyan. This is the method used to produce permanent (solid) images for viewing, such as for color copying and color printing. These colors are produced by pigments, (paint, ink, etc.) each pigment reflecting only one color and absorbing all others.

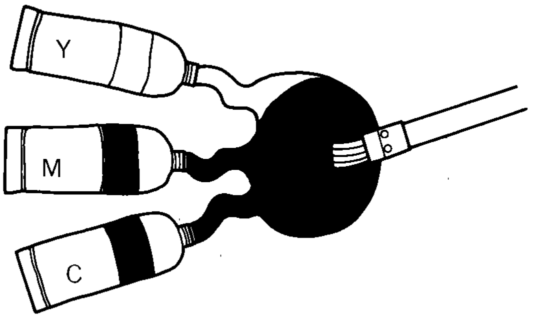


Figure 2-9

b. Pigment characteristics

Primary pigments have the following characteristics.

Yellow: Absorbs blue light and reflects green and red light.
Magenta: Absorbs green light and reflects blue and red light.
Cyan: Absorbs red light and reflects blue and green light.

For example, when white light (400 to 700 nm) shines on a yellow plate, wavelengths in the blue range (400 to 500 nm) are absorbed, while green (500 to 600 nm) and red (600 to 700 nm) wavelengths are reflected. Thus, the reflected green and red light is mixed and is perceived as yellow.

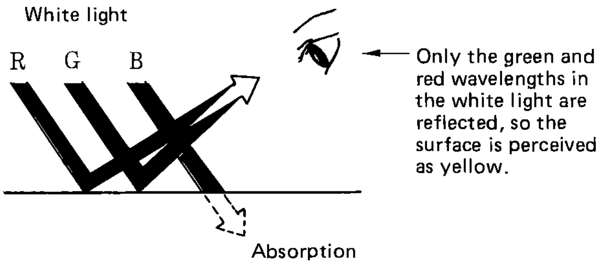

White light
R
G
B
Only the green and red wavelengths in the white light are reflected, so the surface is perceived as yellow.
Absorption

Figure 2-10

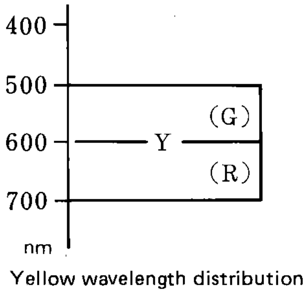
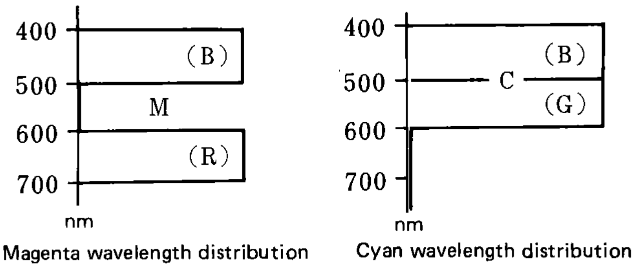

400
500
600
700
nm
Y
(G)
(R)
Yellow wavelength distribution

Figure 2-11

The same principles apply to magenta and cyan.


400
500
600
700
nm
M
(B)
(R)
C
(B)
(G)

Magenta wavelength distribution Cyan wavelength distribution

Figure 2-12

Light color \ Pigment (document)	Y		
	Absorbed	Reflected	Reflected
	Reflected	Absorbed	Reflected
	Reflected	Reflected	Absorbed

Table 2-2 Pigment characteristics

c. Mixing pigments

When yellow and magenta pigments are mixed, the result appears red. Yellow absorbs blue light and magenta absorbs green light. Mixing yellow and magenta combines these qualities. If a mixture of these two pigments is exposed to white light the result will appear red, because only red will be reflected.

The Color Laser Copier uses yellow, magenta and cyan toners to reproduce the colors of an original placed on the copyboard glass of the reader unit.

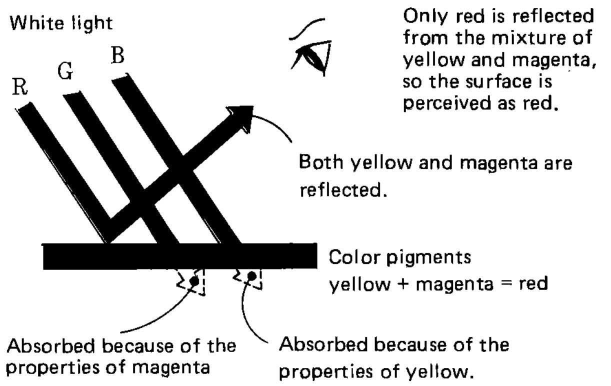

White light
R
G
B
Only red is reflected from the mixture of yellow and magenta, so the surface is perceived as red.
Both yellow and magenta are reflected.
Color pigments yellow + magenta = red
Absorbed because of the properties of magenta
Absorbed because of the properties of yellow.

Figure 2-13

Expressing all this in equations yields the following relationships:

$$\boxed{Y} = \underset{(B+G+R)}{W} - \boxed{B} = \boxed{R} + \boxed{G}$$

$$\boxed{M} = \underset{(B+G+R)}{W} - \boxed{G} = \boxed{B} + \boxed{R}$$

$$\boxed{C} = \underset{(B+G+R)}{W} - \boxed{R} = \boxed{B} + \boxed{G}$$

$$\boxed{Y} + \boxed{M} + \boxed{C} = \underset{(B+G+R)}{W} - \boxed{B} - \boxed{G} - \boxed{R} = \boxed{BK}$$

W = white
BK = black

If all the color pigments are mixed, the three primary colors (B, G and R) will all be completely absorbed, so no light at all will be reflected, and the result will be black (BK).

The following relationships show how red, green and blue are reproduced using yellow, magenta and cyan pigments.

$$\boxed{Y} + \boxed{M} = \underset{(B+G+R)}{W} - \boxed{B} - \boxed{G} = \boxed{R}$$

$$\boxed{M} + \boxed{C} = \underset{(B+G+R)}{W} - \boxed{G} - \boxed{R} = \boxed{B}$$

$$\boxed{Y} + \boxed{C} = \underset{(B+G+R)}{W} - \boxed{B} - \boxed{R} = \boxed{G}$$

D. Color Separation

The opposite of color mixing is extracting a particular color from a given mixture. This is called color separation. The process uses the characteristic of a material with intrinsic transmitted color. As described earlier, such a material is transparent only to the color of the material itself and it absorbs all other colors. A material with such properties used in this manner is called a filter. (One such material is cellulose acetate.)

The process is called "color separation", and can be performed by filters of either the R, G, B (additive), or Y, C, M (subtractive series). Additive filters pass only one color, while subtractive pass two.

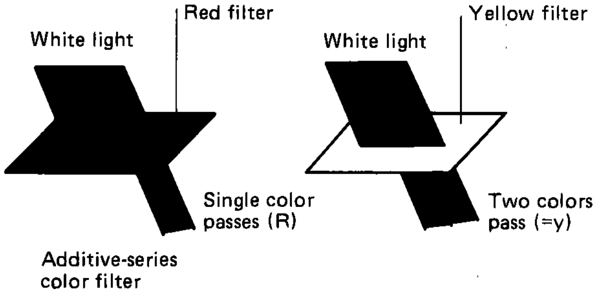


Figure 2-14

Filters of the three primary additive (R, G, B) colors are used for color separation for color copiers and color printing, for magazines, etc.

The colors are reproduced with Y, M, C pigments. This process is explained in the following pages.

II. PRINCIPLES OF COLOR COPYING

A. Overview

1. The Color Laser Copier uses a photosensitive drum, like conventional monochrome copiers.
2. Information about the colors and density of each color in the original is extracted by color separation. In this copier, the information for three primary colors is converted into digital electronic form.
3. Each of the separated images is "reconstituted" in turn on the drum by a laser beam and developed by one of the three color toners (optionally with black added). (Each color toner image is transferred to the paper before the next color is produced.)
4. The paper passes through the fixing unit, which heats and presses the toner, melting, mixing, and fusing it to the paper to form the final copy.

B. Method of Reproducing Color in Color Copiers

1. Introduction

Assume that a document with separate areas of the three subtractive colors yellow, magenta and cyan, is exposed to white light from the scanning lamp. The reflected light passes to the photosensitive CCD unit through side-by-side blue, green and red color separation filters, as shown in Figure 2-15.

The following sections explain the effect of the color separation filters on the light reflected from the document, first assuming ideal filter and pigment characteristics, then discussing actual operation.

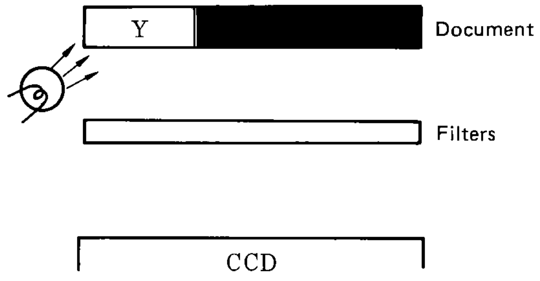
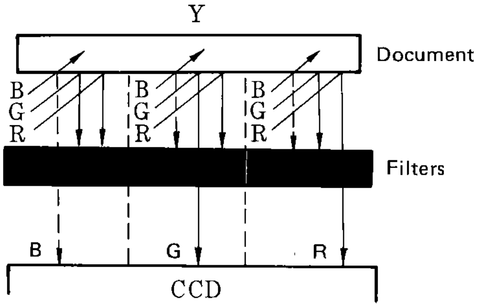


Figure 2-15

2. Color separation

a. Document yellow area(s)

For theoretically perfect yellow, any blue in white light (B+G+R) illuminating yellow areas of the document is absorbed by the yellow of the document, and the green and red are reflected. Green and red light pass through the green and red filters, respectively, to the CCD, but no light passes through the blue filter.



Amount of light passing B filter is inversely proportional to amount of yellow in original.

Figure 2-16

In reality, the ability of yellow to absorb blue depends on the saturation (relative concentration of "pure" yellow and white) of the yellow, so varying amounts of blue may actually be reflected from surfaces containing yellow.

The signals which can be produced by the CCD photocells following a blue filter are not necessarily zero for yellow, but a range from 0 to 255, inversely proportional to the saturation of yellow in the original.

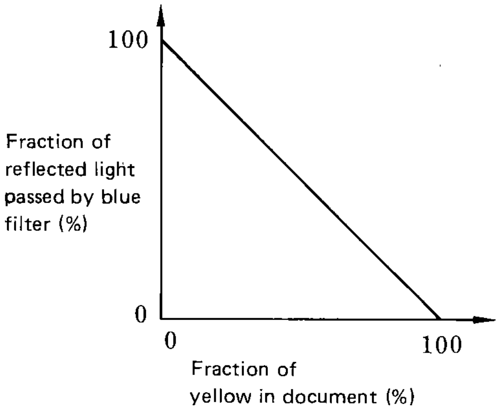
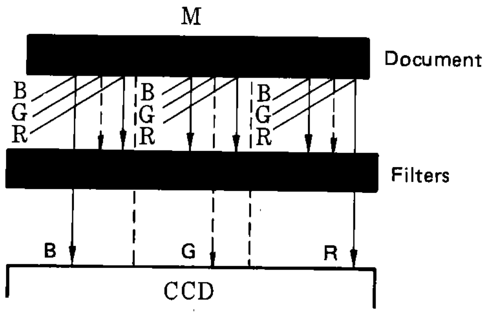


Figure 2-17

b. Document magenta area(s)

Theoretically, magenta areas of the document absorb all green light and reflect blue and red. In actuality, light passes through the green filter inversely proportional to the saturation of magenta in the original, and the CCD following a green filter generates a signal (0 to 255) inversely proportional to the saturation of magenta.

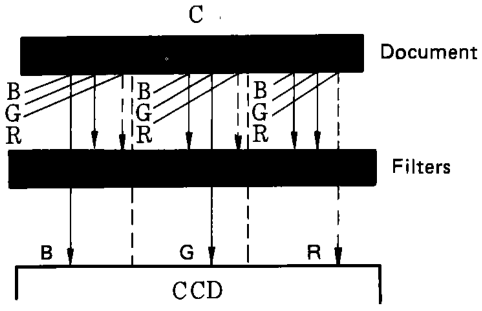


Amount of light passing G filter is inversely proportional to amount of magenta in original.

Figure 2-18

c. Document cyan area(s)

Theoretically, cyan areas of the document absorb all red light and reflects blue and green. In actuality, light passes through the green filter inversely proportional to the saturation of cyan in the original, and the CCD following a red filter generates a signal (0 to 255) inversely proportional to the saturation of cyan.



Amount of light passing R filter is inversely proportional to amount of cyan in original.

Figure 2-19

3. Producing the copy

The CCD produces signals that are proportional to the amount of blue, green and red light reaching it. The more of a color there is in the original, the lower the signal (in the range 0 to 255) for that color. (There are separate scanning operations for each color.) The three signals are inverted so that each signal is directly proportional to the amount at color in the original. These signals are then used to operate the laser of the printer.

As the laser scans (is swept over the surface of) the photosensitive drum of the printer, it is switched ON whenever the color then being reproduced is present in the original document, and is kept OFF where the color is not present. The intensity of the light from the laser can be varied to reproduce a range of densities from 0 to 255; the inverted signals from the CCD supply this information.

The Color Laser Copier uses toner of yellow, magenta and cyan. (As detailed on page 2-12, a fourth signal is also produced if black toner is also being used to improve the reproduction of black.) Each color is deposited in turn, on the drum to reproduce that color, then is transferred to the copy paper, after which the next color is reproduced. When all colors (toners) have been transferred to the copy paper (in correct registration), the image is made permanent by heat and pressure in the fixing assembly.

Because each color of toner is deposited on the copy in proportion to the amount of that color in the original the colors of the original are reproduced quite accurately.

III. IMAGE SCANNER UNIT

A. Overview

Fig. 2-20 shows the main components of the Image Scanner (reader) unit.

The document is illuminated by the scanning lamp, a narrow strip of optical image of the document is focussed onto a linear array of very small photosensitive elements (a charge coupled device, or CCD), each of which generates an electrical signal representing the intensity of light at that location. The array has color separation filters which allow the CCD to generate a signal indicating the color at each point along the array.

This electrical signal is processed as required by the image processing unit, (editing), and transmitted to the printer unit by cable.

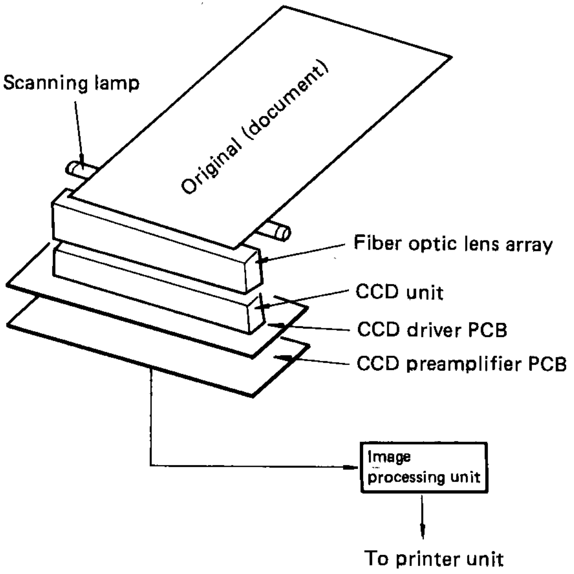

Scanning lamp
Original (document)
Fiber optic lens array
CCD unit
CCD driver PCB
CCD preamplifier PCB
Image processing unit
To printer unit

Figure 2-20

B. CCD Unit

1. Introduction

The CCD unit (charge coupled device) of the Laser Color copier is made up of a linear array of photosensors (photodiodes) each several tens of micrometers square, each with related capacitor and electronic switches. Its output is a digital signal that contains the analog information for every cell of the array.

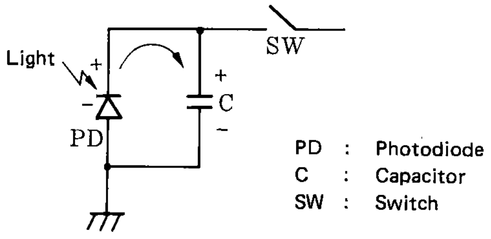

Light
+
-
PD
+
C
-
SW
PD : Photodiode
C : Capacitor
SW : Switch

Figure 2-21 CCD photo detector equivalent circuit

Figure 2-21 is the equivalent circuit diagram of one CCD element.

When light strikes the photodiode, an electromotive force is generated in the photodiode, and electrons flows in the direction of the arrow. Charge builds up in the capacitor (C) in proportion to the intensity of light striking the photodiode (inversely proportional to density of image of original).

The switch (SW) functions like the shutter of a movie camera. Each time it operates the image of that scanning line is "frozen". The frequency with which this switch is opened and closed sets the distance (on the document) between vertical scanning lines (and, thus, the vertical resolution).

Normally, the switching speed is selected so that the vertical scanning line density is equal to the horizontal scanning line density (determined by the size of a CCD element).

In this way the original image is broken into small square areas about 60 micro meters on a side.

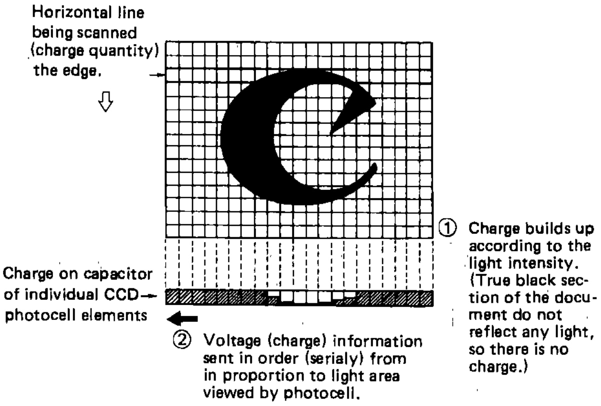

Horizontal line being scanned (charge quantity) the edge.
① Charge builds up according to the light intensity. (True black section of the document do not reflect any light, so there is no charge.)
Charge on capacitor of individual CCD photocell elements
② Voltage (charge) information sent in order (serialy) from in proportion to light area viewed by photocell.

Figure 2-22

Figure 2-23 illustrates the principles of CCD operation.

The CCD unit is made up of a large number of photocell element (photodiode, capacitor, electronic switch) plus a transfer unit and an output (amplifier) unit. The switch of each element closes at the same time, and the voltage on the capacitor of each is read by the transfer unit. The transfer unit then outputs an amplified version of each voltage in sequence to the image processing unit.

The photocell elements have color separation filters built in, alternating R, G, B along the full length of the array, and the output serial signal provides information for each color (color separation).

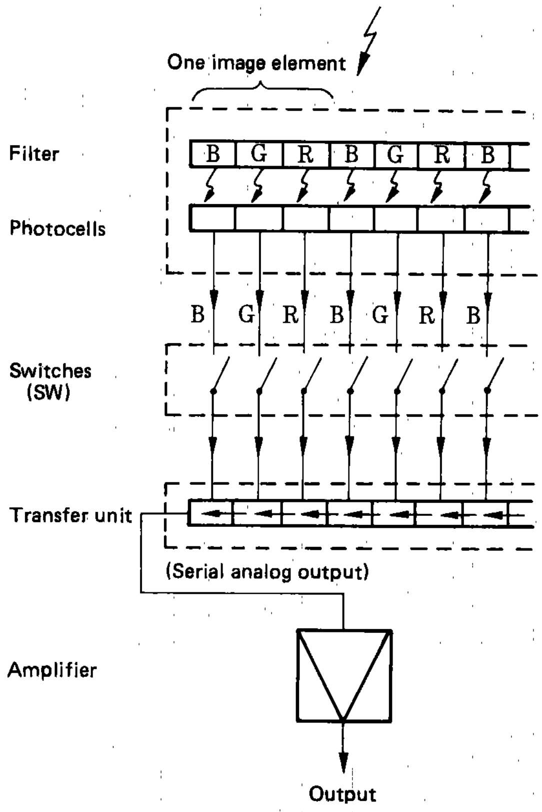

One image element
Filter
B
G
R
B
G
R
B
Photocells
B
G
R
B
G
R
B
Switches (SW)
Transfer unit
(Serial analog output)
Amplifier
Output

Figure 2-23

There are five independent CCDs in this Image Scanner.

They each transfer signals sequentially from the edge, so that five systems of signals are being outputted simultaneously.

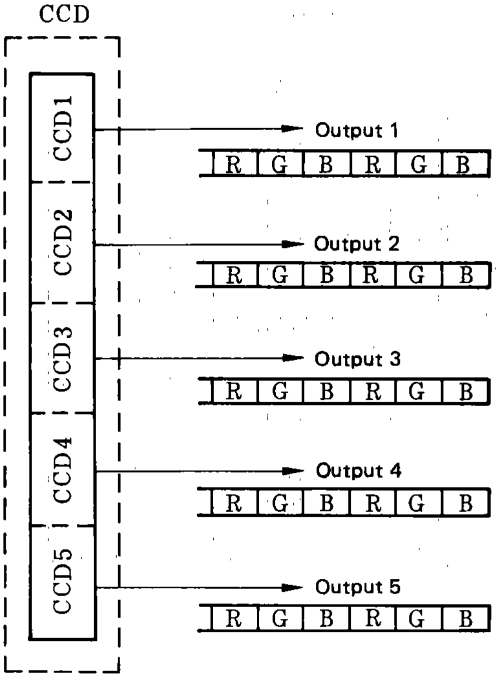

CCD
CCD1
CCD2
CCD3
CCD4
CCD5
Output 1
Output 2
Output 3
Output 4
Output 5
R G B R G B
R G B R G B
R G B R G B
R G B R G B
R G B R G B

Figure 2-24

C. Image Processing Unit

1. Overview

Figure 2-25 a block diagram of the image processing unit showing the main functions.

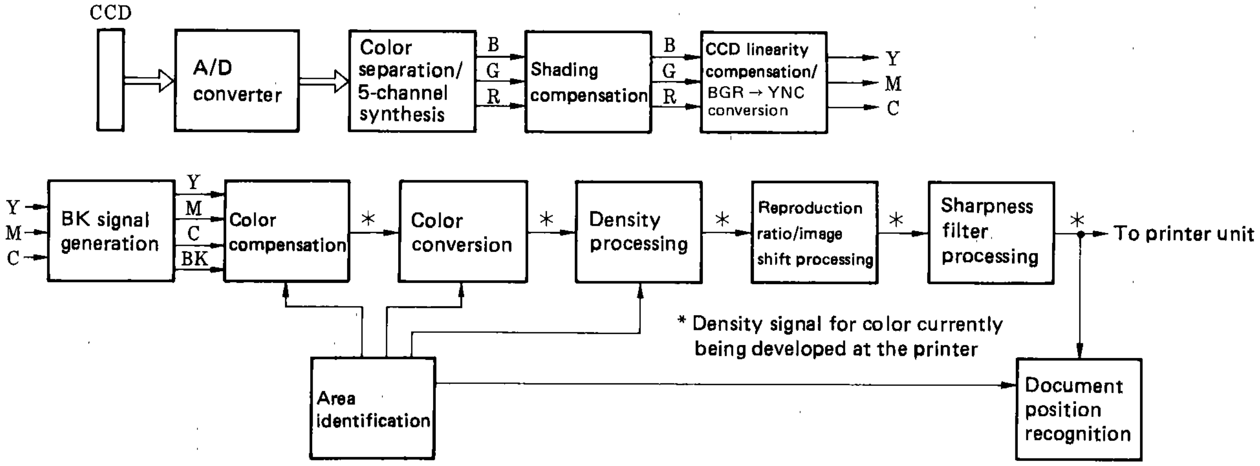

CCD
A/D converter
Color separation/ 5-channel synthesis
B
G
R
Shading compensation
B
G
R
CCD linearity compensation/ BGR → YNC conversion
Y
M
C
Y
M
C
BK signal generation
Y
M
C
BK
Color compensation
*
Color conversion
*
Density processing
*
Reproduction ratio/image shift processing
*
Sharpness filter processing
*
To printer unit
* Density signal for color currently being developed at the printer
Area identification
Document position recognition

Figure 2-25

The five image element electrical (analog) signals simultaneously sent from the five independent CCDs are converted to digital signals by five A/D converters.

At the color separation/5-channel synthesis unit, the five systems of image data are temporarily stored. When data for one horizontal scanning line have been accumulated, the data are outputted separately for blue, green and red colors.

Next at the shading compensation unit, variation in output of individual elements of the CCDs, output along the length of the scanning lamp, etc., is compensated for.

Non-linearity in the CCD output is compensated for at the CCD linearity compensation/ BGR → YMC converter to produce the gradations for printing, and the BGR signals are converted into YMC toner density signals.

At the BK signal generation unit, the BK signal is generated from the three-color YMC signal.

At the color compensation unit, along with compensating for the density levels of each color to conform to the filter and toner characteristics, the density signal for the color being developed at the printer unit is output.

Color processing (specified color conversion, painting, framing and blanking) is performed at the color conversion unit to suit inputs via the control panel.

At the density processing unit, the signal is modified to suit inputs from the control panel (copy density, color balance).

Reproduction ratio/image shift processing in the horizontal scanning direction is performed by the reproduction ratio/image shift processing unit by changing the timing of writing or reading image data to/from memory.

The sharpness/filter processing unit produces an image to suit the sharpness mode specified via the control panel.

The document position recognition unit detects the position of the document on the copyboard glass.

Signals identifying areas in which image modifications are to occur are generated by the area identification unit and sent to the BK signal generation, color compensation, color conversion, and density processing units.

2. A/D conversion

The signals outputted by the CCDs are analog signals, and must be converted into digital signals. The five independent CCDs output five streams of analog signals which are converted separately by an A/D converter into separate 8-bit digital signals. Each 8-bit digital signal can express 256 steps (0 to 255) of image density.

Figure 2-27 shows an example of an A/D conversion.

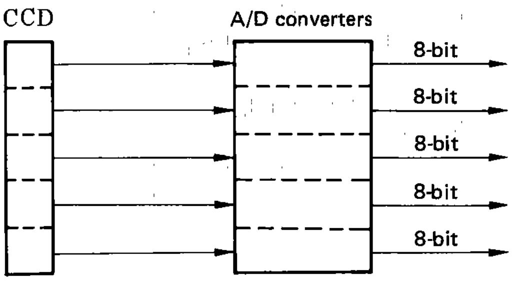

CCD
A/D converters
8-bit
8-bit
8-bit
8-bit
8-bit

Figure 2-26 A/D conversion

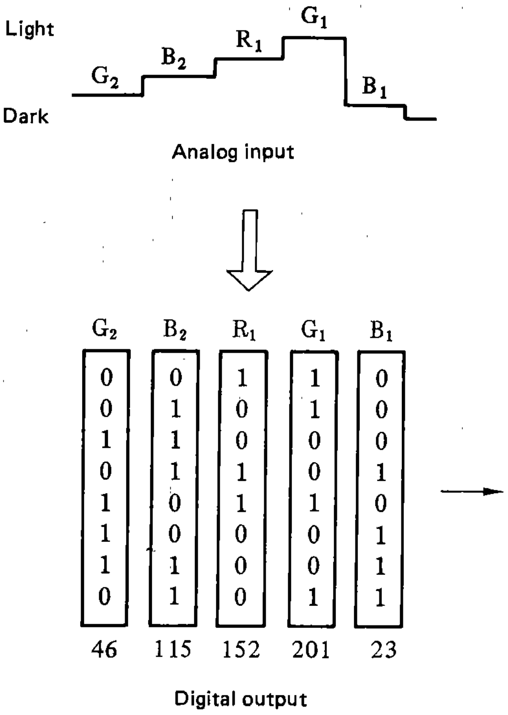

Light
Dark
G_1
R_1
B_2
G_2
B_1
Analog input
G_2 B_2 R_1 G_1 B_1
0 0 1 1 0
0 1 0 1 0
1 1 0 0 0
0 1 1 0 1
1 0 1 1 0
1 0 0 0 1
1 1 0 0 1
0 1 0 1 1
46 115 152 201 23
Digital output

Figure 2-27

3. Color separation/5-channel synthesis

The five A/D converters continually output density data for the three colors, blue, green and red in sequence (intermixed). This unit separates the data for each color and outputs one signal for each color (three signals). These are data for the horizontal scanning direction.

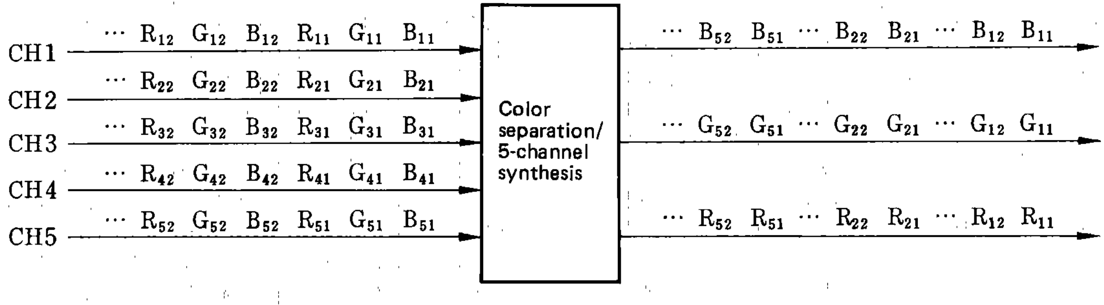

CH1 $\cdots R_{12}\ G_{12}\ B_{12}\ R_{11}\ G_{11}\ B_{11}$
CH2 $\cdots R_{22}\ G_{22}\ B_{22}\ R_{21}\ G_{21}\ B_{21}$
CH3 $\cdots R_{32}\ G_{32}\ B_{32}\ R_{31}\ G_{31}\ B_{31}$
CH4 $\cdots R_{42}\ G_{42}\ B_{42}\ R_{41}\ G_{41}\ B_{41}$
CH5 $\cdots R_{52}\ G_{52}\ B_{52}\ R_{51}\ G_{51}\ B_{51}$
Color separation/ 5-channel synthesis
$\cdots B_{52}\ B_{51} \cdots B_{22}\ B_{21} \cdots B_{12}\ B_{11}$
$\cdots G_{52}\ G_{51} \cdots G_{22}\ G_{21} \cdots G_{12}\ G_{11}$
$\cdots R_{52}\ R_{51} \cdots R_{22}\ R_{21} \cdots R_{12}\ R_{11}$

Figure 2-28 Color separation/5-channel synthesis unit

4. Shading compensation

Even if light striking the CCD is completely uniform along the length of the CCD, the output corresponding to each image element is not necessarily the same for the following reasons.

Reasons:
1. Sensitivity of image elements may vary.
2. Light transmitted by the optical fiber lens array may vary.
3. Distribution of light output differs along the length of the scanning lamp.
4. Scanning lamp darkening and ageing.

Shading compensation is performed as follows to compensate for these factors.

First, the scanner is moved below the standard white sheet and the scanning lamp is switched ON. The CCD produces its output, one signal for each element. The deviation of output of each element from the standard output (255*) is determined and stored in memory, and used when scanning a document to compensate for difference in sensitivity from element to element. This is called "shading compensation", and gives a uniform output.

This compensation process is performed every time the COPY START key is pressed.

*: The standard output can be changed by <DOC B-LEV> in the Service mode.

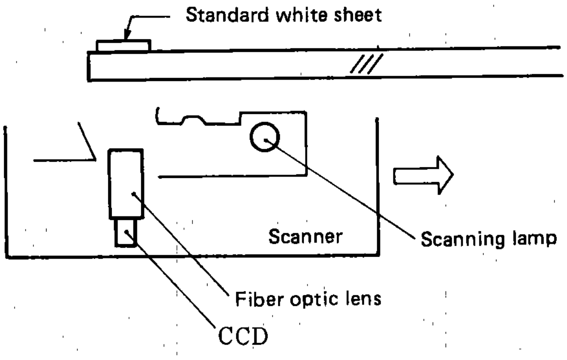


Figure 2-29

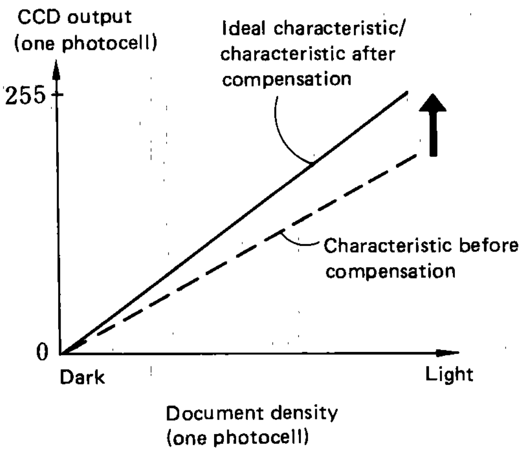


Figure 2-30 Shading compensation for one cell (typical)

5. CCD linearity compensation/BGR → YMC conversion

The amount of light of a particular color reflected from a document is inversely proportional to the amount of toner of the complementary color that must be deposited on a copy to reproduce the reflected color. For example, the greater the amount of reflected blue, the less the required amount of yellow toner.

The BGR → YMC conversion circuit modifies the signals to cause correct development of colors. The relationship between reflected color and required toner is shown in Figure 2-31.

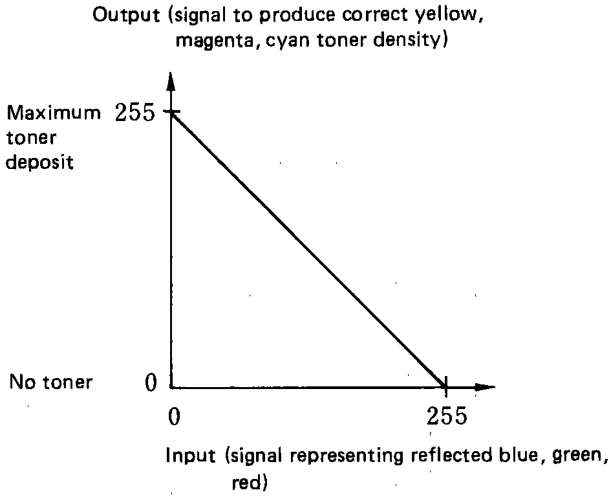
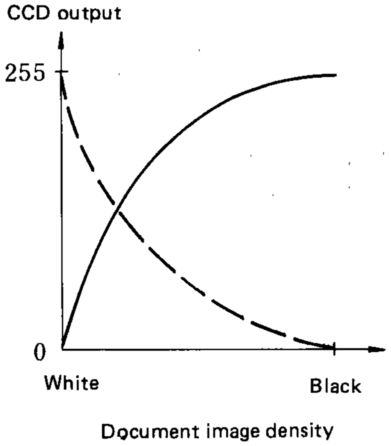


Figure 2-31 BGR → YMC conversion

Reference:

Y=B, M=G, C=R
BGR......color reflected by original
YMC.....toner density

Figure 2-32 shows the relation between CCD output and document image density.



---- Before BGR → YMC conversion
—— After BGR → YMC conversion

Figure 2-32

The output is not linear, becoming proportionally less at darker document image density. This is corrected to give a linear output (output proportional to document image density) by the linearity compensation circuit. The relationship of input to output is as shown in Figure 2-33.

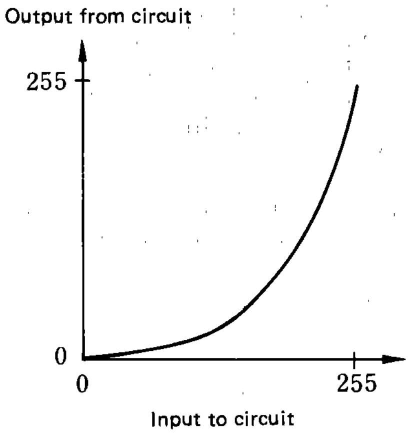


Figure 2-33 Linearity compensation

6. BK signal generation

This is the stage at which the BK (black) toner density signal is generated from the yellow, magenta and cyan toner density signals.

In theory it is sufficient to mix the three color toners in equal proportions to reproduce black areas, but blacks can be improved by using black toner in addition to the three color toners.

The minimum value of signals Y, M, C is obtained from the yellow, magenta and cyan components of each image element. The black component of the image element in question is taken as this minimum value multiplied by the compensation coefficient β, ie, βMin (Y, M, C).

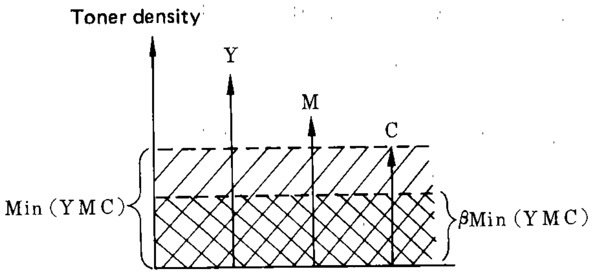


Figure 2-34

7. Color compensation

This refers to compensation for the transmission characteristics of the blue, green and red filters in the CCD and the reflection characteristics of the yellow, magenta and cyan toners in the printer unit.

The explanation below uses a green filter and magenta toner as an example.

Filter Characteristics

The ideal characteristic for a green filter is that it lets through 100% of the light in the wavelength range from 500 nm to 600 nm (green), while not letting through any light of wavelength below 500 nm nor greater than 600 nm. But the regions a, b, and c in Figure 2-35 exist in the characteristic of actual green filters.

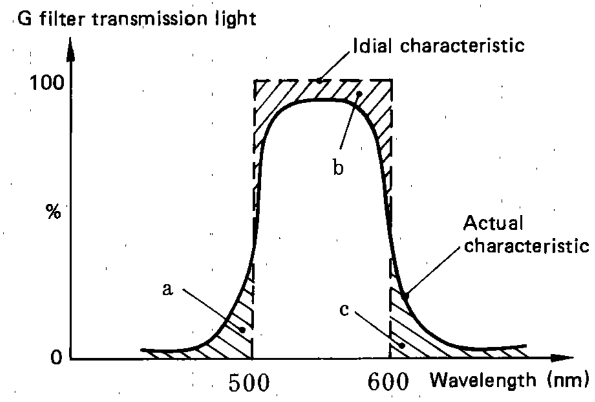


Figure 2-35

Toner Characteristics

The ideal characteristics for the magenta toner are that it would absorb 100% of light of wavelength in the range 500 nm to 600 nm (green), and reflect all wavelengths below 500 nm and above 600 nm. But, again, regions of non-ideality exist in the characteristics of practical magenta toners (d, e and f in Figure 2-36).

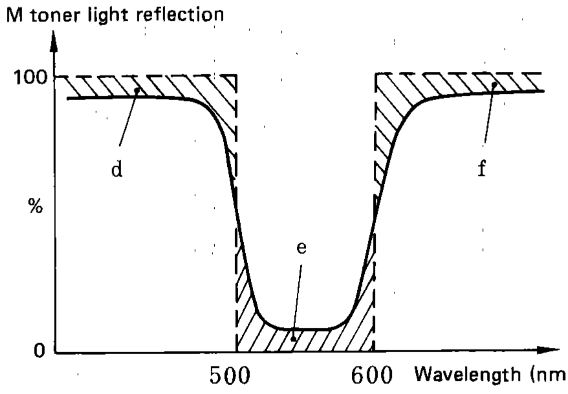


Figure 2-36

8. Color conversion

Specified color conversion, painting, framing and blanking are performed at this stage.

a. Specified color conversion

This refers to specifying a particular color in the document and converting only that color to another color.

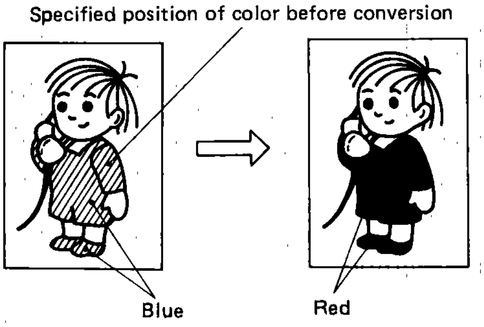

Specified position of color before conversion
Blue
Red

Figure 2-37 Color conversion of specified color

The color to be converted is specified by indicating (via the editor) the position of the color to be charged. The scanner moves to the indicated position, and obtains the image data needed to determine the required densities yellow, magenta and cyan toner required to make up the present image.

The color to which the area is to be converted can be selected from a specified color, standard colors, registered colors and white (blank).

· Specified color:	specified in exactly the same way as the color specified to be converted.
· Standard colors:	blue, green, red, yellow, magenta, cyan, and black.
· Registered colors:	Colors previously registered using the color recognition function.

A small area within the region can also be specified and the color converted only in that area.

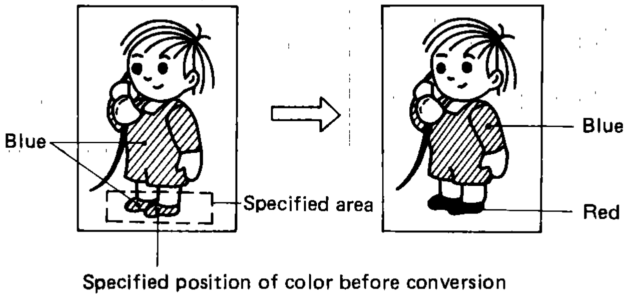

Blue
Specified area
Blue
Red
Specified position of color before conversion

Figure 2-38 Color conversion of specified color within specified area of original

b. Painting

This mode can be used to completely color the region inside or outside a specified area in a selected color.

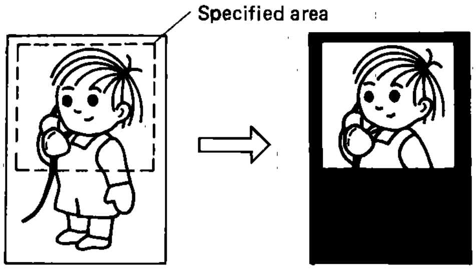


Figure 2-39 Painting region outside specified area

The painting color is specified in the same way as the desired color in specified in the same way as the desired color in specified color conversion, and can be selected from a specified color, standard colors, registered colors, and white.

c. Framing

The signals for the areas outside the specified area are made white, irrespective of the image signals for the original.

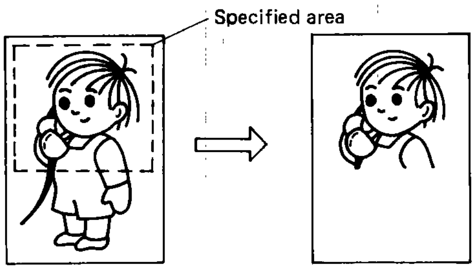


Figure 2-40 Framing

d. Blanking

This is the reverse of framing. The signals for the areas inside the specified area are made white, irrespective of the image signals for the original.

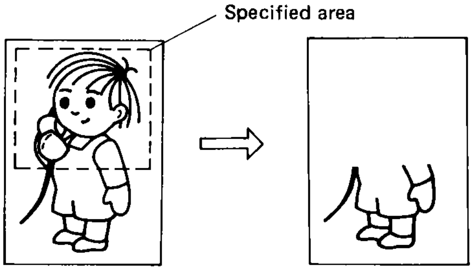


Figure 2-41 Blanking

9. Density processing

The output level is increased or decreased to suit the density adjustment, color balance and negative/positive inversion instructions from the control panel.

Using the area identification function, an area can be specified in which a change, such as negative/positive inversion, can be specified.

For example, the images shown in Figure 2-42 can be obtained when negative/positive inversion is specified for the area inside the broken line.

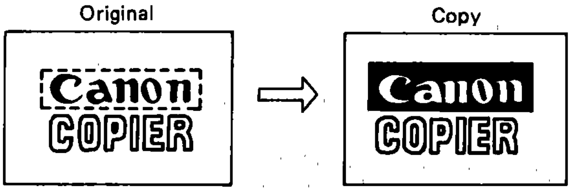


Figure 2-42

10. Reproduction ratio processing

a. Horizontal reproduction ratio (Horizontal scanning direction)

The reproduction ratio in the horizontal scanning direction is changed by omitting data bits while writing data into memory (REDUCTION) or reading data bits more than once when reading from memory (ENLARGEMENT).

b. Vertical reproduction ratio (Vertical scanning direction)

The reproduction ratio in the vertical scanning is changed by the scanner moving faster (REDUCTION) or slower (ENLARGEMENT) to change the width of the area on the document during reading for one bit.

Table 2-4 shows the reproduction ratio processing method.

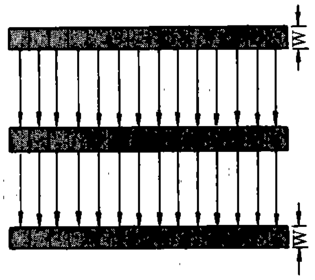
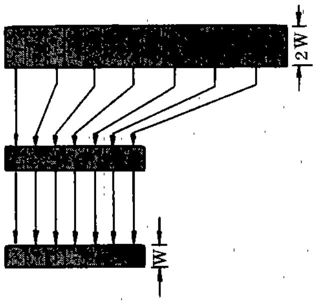
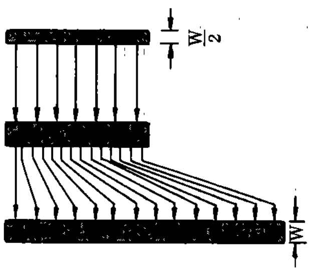
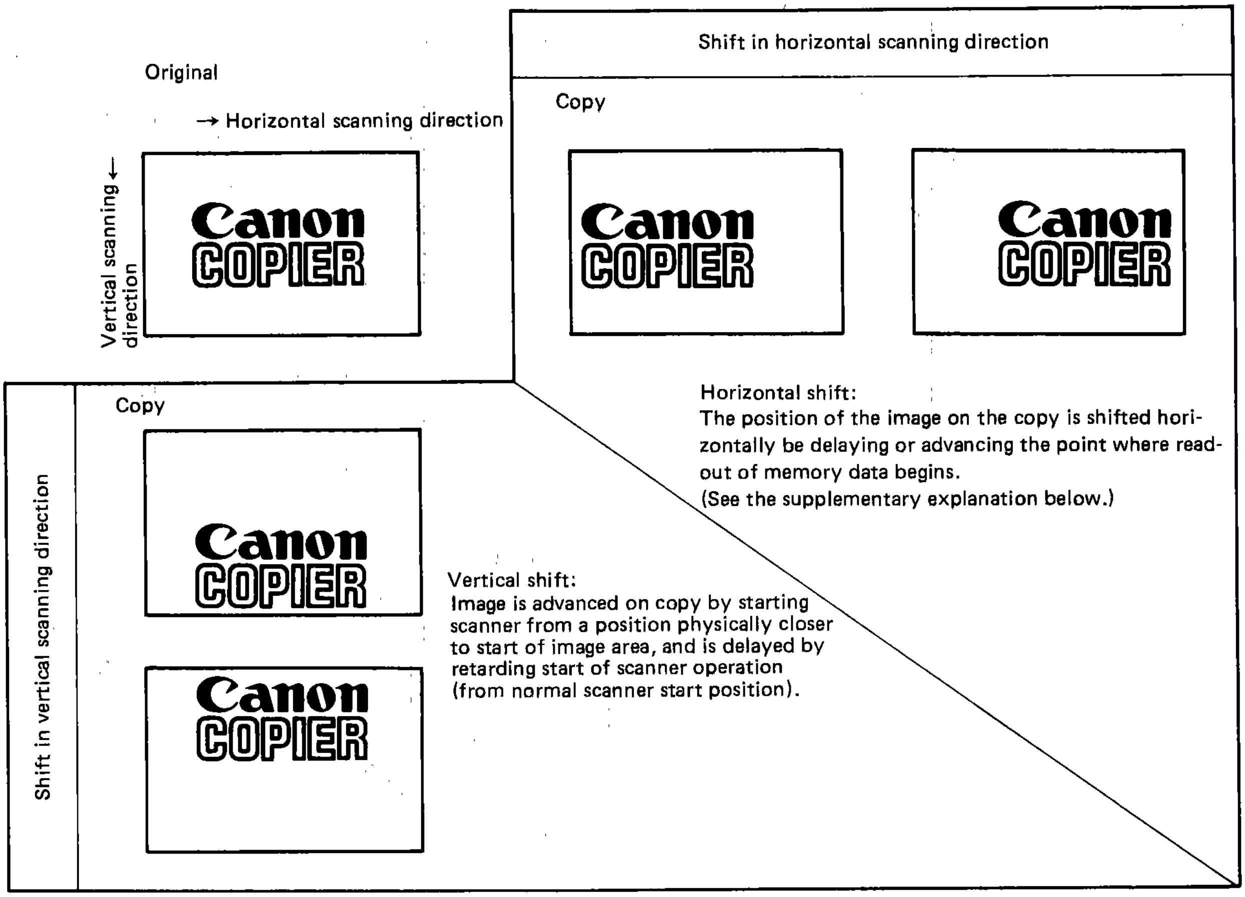
	DIRECT	REDUCTION	ENLARGEMENT
Original (image data) Data in line memory (writing) Data used for copy (reading)			
Horizontal scanning	All data are written into memory unmodified and read out and used for the copy with no changes.	If the size of the original image being reduced by half, for example, only every second item of image data is written to memory.	If the size of the original image, is being doubled, for example, all data are written to memory unmodified, and each item of image data is read out twice.
Vertical scanning		The speed at which the scanner moves is increased, thereby enlarging the width of the individual image elements read for one line, thus reducing the number of lines per page.	The speed at which the scanner moves is reduced, thereby narrowing the width of the individual image elements read for one line, thus increasing the number of lines per page.

Table 2-3

11. Image shift processing

Figure 2-43 gives a brief overview of the principles of shifting in the horizontal and vertical scanning directions.

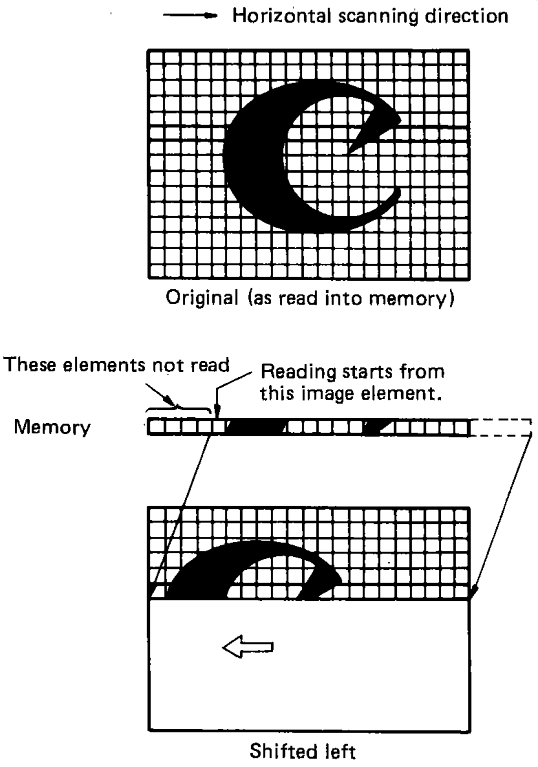

Shift in horizontal scanning direction
Original
→ Horizontal scanning direction
Vertical scanning ↓ direction
Copy
Canon COPIER
Canon COPIER
Canon COPIER
Copy
Shift in vertical scanning direction
Canon COPIER
Canon COPIER

Horizontal shift:
The position of the image on the copy is shifted horizontally be delaying or advancing the point where read-out of memory data begins.
(See the supplementary explanation below.)

Vertical shift:
Image is advanced on copy by starting scanner from a position physically closer to start of image area, and is delayed by retarding start of scanner operation (from normal scanner start position).

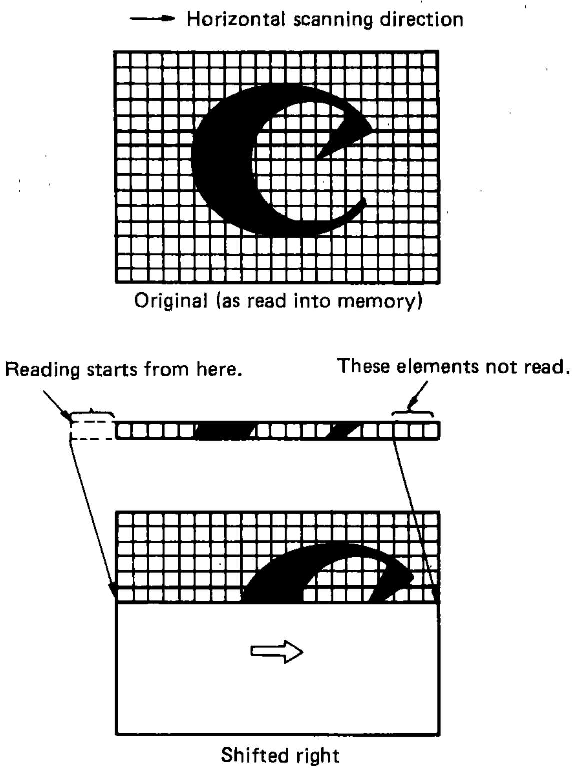
Figure 2-43

Supplementary explanation: Shift in horizontal scanning direction


→ Horizontal scanning direction
Original (as read into memory)
These elements not read
Reading starts from this image element.
Memory
⇦

Shifted left

Figure 2-44


→ Horizontal scanning direction
Original (as read into memory)
Reading starts from here.
These elements not read.
⇨

Shifted right

Figure 2-45

Combining shifting in the horizontal and vertical scanning direction makes the following moves possible.

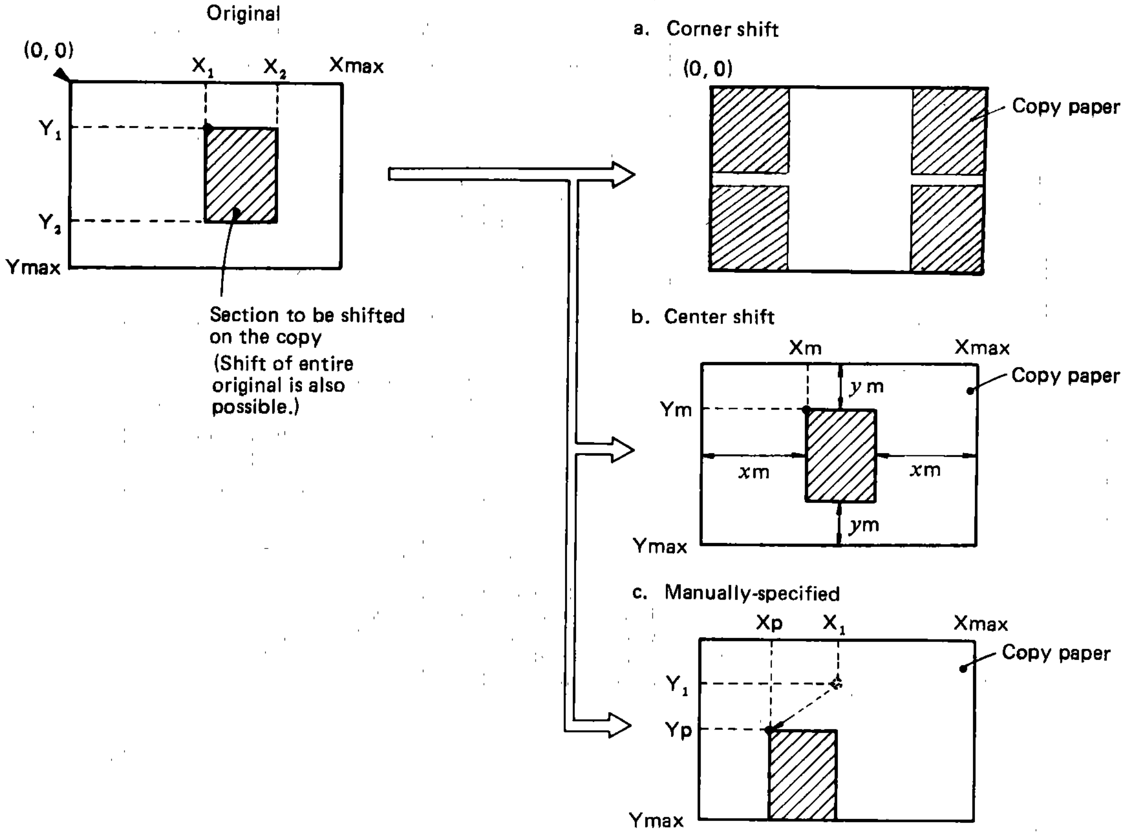

Original
(0, 0)
X_1
X_2
Xmax
Y_1
Y_2
Ymax
Section to be shifted on the copy
(Shift of entire original is also possible.)
a. Corner shift
(0, 0)
Copy paper
b. Center shift
Xm
Xmax
ym
Copy paper
Ym
xm
xm
ym
Ymax
c. Manually-specified
Xp
X_1
Xmax
Copy paper
Y_1
Yp
Ymax

Figure 2-46

a. Corner shift

This means that the section of the original to be displaced can be moved to any of the four corners shown on the copy paper in Figure 2-46a.

b. Center displacement

The selected section (rectangular) of the original is centered on the copy. (The coordinates of the upper left corner are calculated (Xm, Ym) so that the spaces are equal end-end, and top-bottom.)

c. Manually-specified shifting

The corner (coordinates X_1, Y_1) of the section to be displaced is situated in the copy at the point with specified coordinates (Xp, Yp).

12. Sharpness filter processing

The image data are modified to increase or decrease density transitions of density within the copy (emphasize or de-emphasize boundaries) to suit the sharpness mode specified by the operator via the control panel.

Figure 2-47 shows an example of unmodified input image data. Figure 2-47a shows the output when the high-contrast sharpness mode is specified. In this case, the variation between light and dark in the image is emphasized, and more distinct boundaries are obtained.

Figure 2-47b shows the output when the low-contrast sharpness mode is specified. Variation in the image between light and dark is smoothed out, resulting in a softer output image.

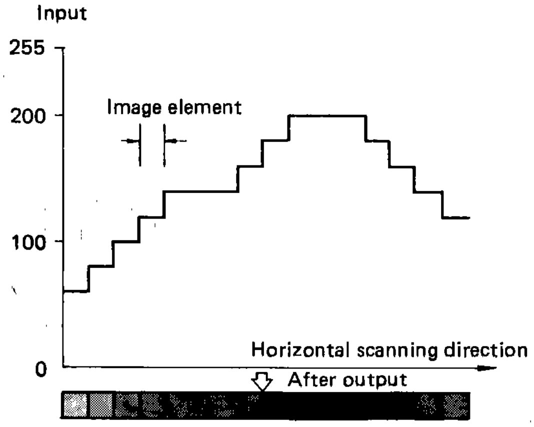


Figure 2-47 Input level

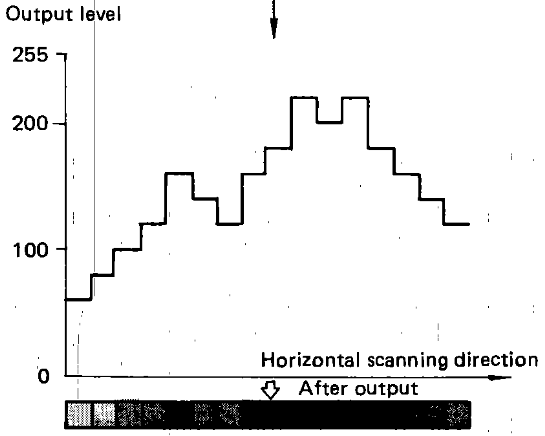


Figure 2-47a High-contrast sharpness mode

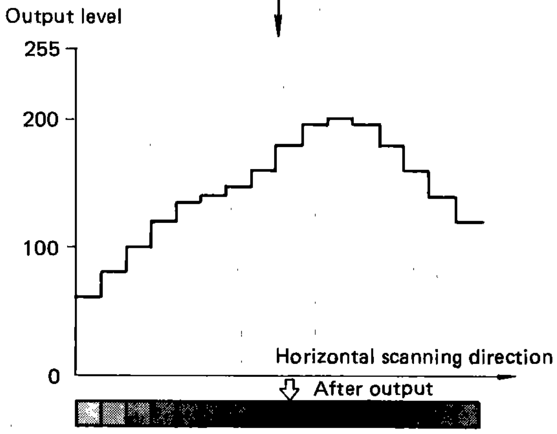


Figure 2-47b Low-contrast sharpness mode

13. Document recognition

Document recognition is the process of sensing the size and position of the document on the copyboard glass.

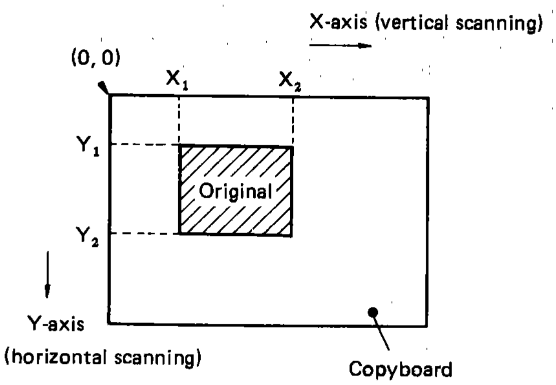

X-axis (vertical scanning)
(0, 0)
X_1
X_2
Y_1
Y_2
Original
Y-axis
(horizontal scanning)
Copyboard

Figure 2-48

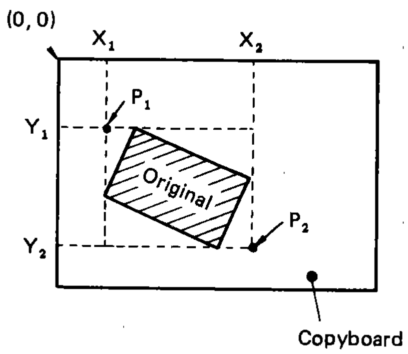

(0, 0)
X_1
X_2
P_1
Y_1
Original
P_2
Y_2
Copyboard

Figure 2-49

Figure 2-48 shows a rectangular document with the X-axis parallel to the vertical scanning and the Y-axis parallel to the horizontal scanning, while Figure 2-49 shows an original placed at an angle to the axes.

Unlike the copyboard covers of most copiers, the bottom surface of the cover of the Laser Color copier has a mirror finish (not white) this prevents diffused reflection of light from the scanning lamp to the CCD.

The only light reaching the CCD is reflected from the area of the copyboard glass covered by the original.

- Reflection from copyboard cover in areas of copyboard glass not covered by the original

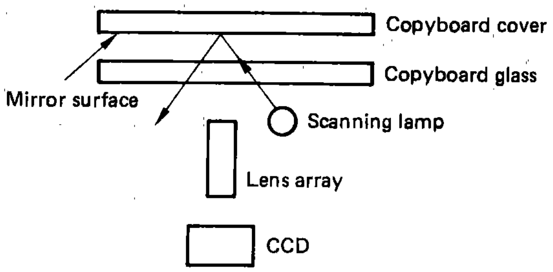

Copyboard cover
Copyboard glass
Mirror surface
Scanning lamp
Lens array
CCD

Figure 2-50

- Reflection from original on copyboard glass (omnidirectional)

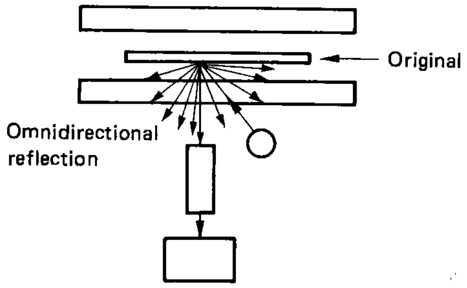

Original
Omnidirectional
reflection

Figure 2-51

Documents are generally on white paper, so any area on the copyboard glass that reflects as white during a measurement scan by the scanning lamp and CCD is regarded as the document.

In principle, the area of the rectangle with the diagonal from coordinates (Xmin, Ymin) to (Xmax, Ymax) is regarded as the area of the original.

However, if the original is placed at an angle to the axes, as in Figure 2-49, the measuring system identifies the rectangle with the diagonal from P1 to P2 as the original.

Reference:

1. Xmin Coordinate of first position in the vertical scanning direction at which change from black to white is detected.
2. Xmax Coordinate of last position in the vertical scanning direction at which change from white to black is detected.
3. Ymin Coordinate in the horizontal scanning direction of the first change from black to white.
4. Ymax Coordinate in the horizontal scanning direction of the last change from white to black.

Automatic recognition of the size and position of the original also enables automatic selection of reproduction ratio, automatic paper selection, and image shift.

14. Shading compensation when the projector is in use

During normal copying, shading compensation is based upon the reference density of the standard white plate. However, when the projector is in use, other references are used.

- When positive film is used:
  Do not put any film in the projector. Have the projector lamp shine directly on the copyboard glass. The density measured there is used as the reference.
- When negative film is used:
  Density of the base film (See the note below).

Note:
For negative film, base film refers to areas with white density (i.e., density of areas not exposed to light during filming). The white density differs between the ISO sensitivity and brand of the film.
The projector is supplied with three types of ISO 100 base film from major film manufacturers. When copying from films for which there is no base film, shading compensation should be done using white density areas of the film.

When the projector is in use, shading compensation involves two steps:

a. Adjusting the white level between channels

The scanner moves to the center of the projector projection area and lights the projector lamp. CPU reads the maximum density data of each channel output by CCD, sets the light intensity of the projector to the standard value, and sets the gain data in the analog processor PCB for each channel.

b. Measuring the shading compensation value

- This measurement is identical to "standard white sheet measurement" of normal copying.

The scanner scans areas near the center of the projection area and reads the density of each picture element for 32 lines. The CPU averages data of 32 lines for each picture element, then stores the difference (the shading compensation value) between the average value and the target output (255) in memory for each picture element of the CCD.

When copies are made, the compensation values in memory are used to normalize the output.

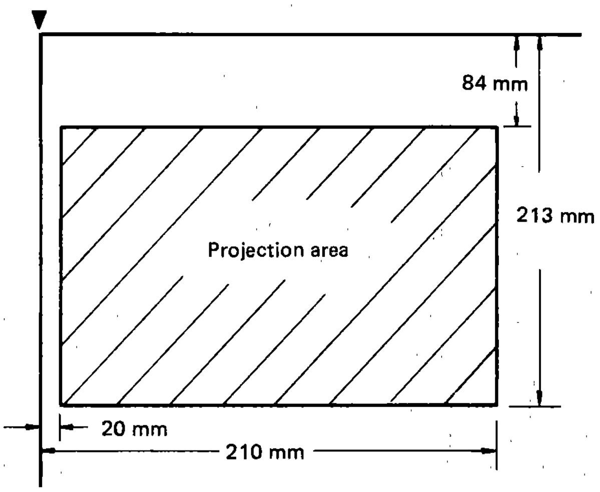


Figure 2-53 Projection area

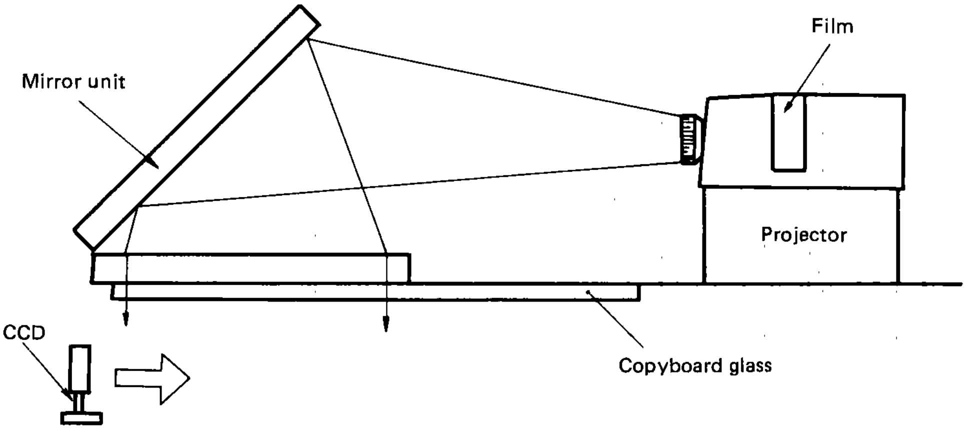


Figure 2-52

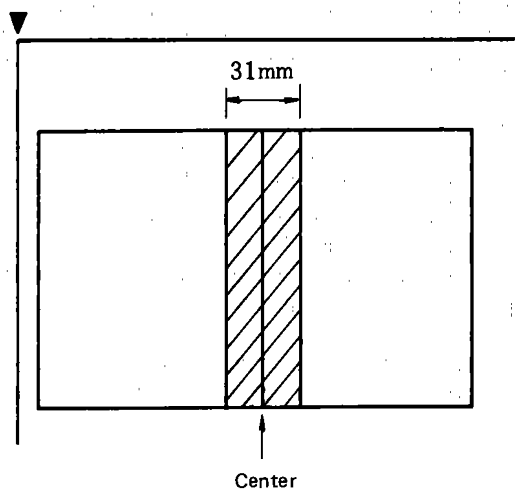


Figure 2-54 Area where projector shading compensation is measured

15. AE (light intensity adjustment) when the projector is in use

The scanner scans areas near the center of the projection area and stores the density data for 16 lines.

During copying, the CPU optimizes the projector light intensity against the density level in memory.

Changing the copy density from the control panel changes the light intensity from the optimum intensity obtained here. For example, when the copy density is changed from 5 to 6, the light intensity increases for positive film and decreases for negative film.

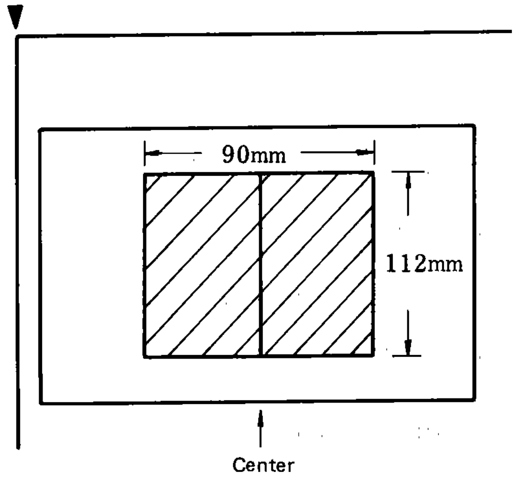


Figure 2-55 Projector AE measuring area

I. BASIC OPERATION

A. Function

The reader (Image Scanner) can be divided into three major systems: exposure, control, and image processing systems.

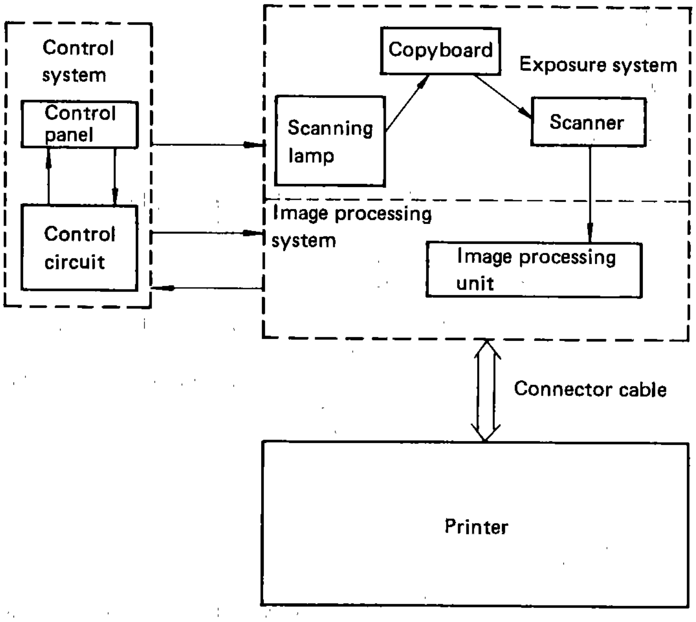

Control system
Control panel
Control circuit
Copyboard
Exposure system
Scanning lamp
Scanner
Image processing system
Image processing unit
Connector cable
Printer

Figure 3-1

B. Electrical Circuit Overview

Electrical components are controlled mainly by the microprocessor on the CPU PCB and the microprocessor on the scanner motor control PCB.

The microprocessor on the CPU PCB mainly controls image processing in the digital processor, while the microprocessor on the scanner motor control PCB mainly controls the scanner motor.

Each small area of the optical image (light) reflected from the document is converted by the CCD to an equivalent electronic (analog) voltage, amplified by the CCD preamplifier PCB, and then converted to equivalent digital data by the A/D converter of the analog processor PCB. Image processing is performed by the digital processor PCB, and the result is transmitted to the printer as an 8-bit video signal.

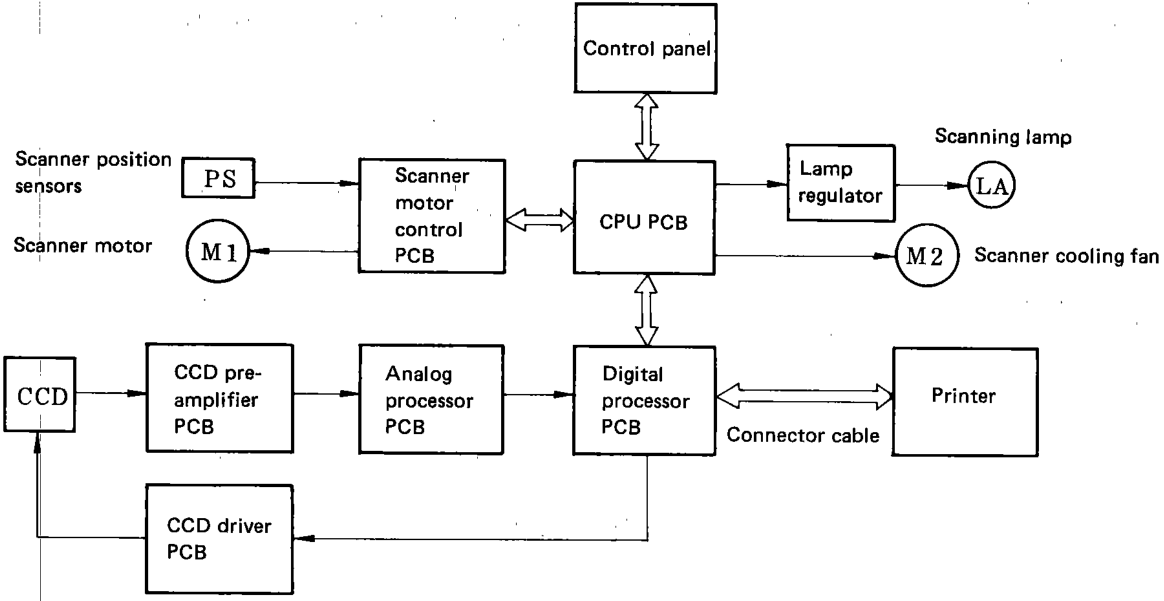

Control panel
Scanning lamp
Scanner position sensors
PS
Scanner motor control PCB
CPU PCB
Lamp regulator
LA
Scanner motor
M1
M2
Scanner cooling fan
CCD
CCD pre-amplifier PCB
Analog processor PCB
Digital processor PCB
Printer
Connector cable
CCD driver PCB

Figure 3-2

C. Input/Output for the Main PCBs

1. CPU PCB Input/Output

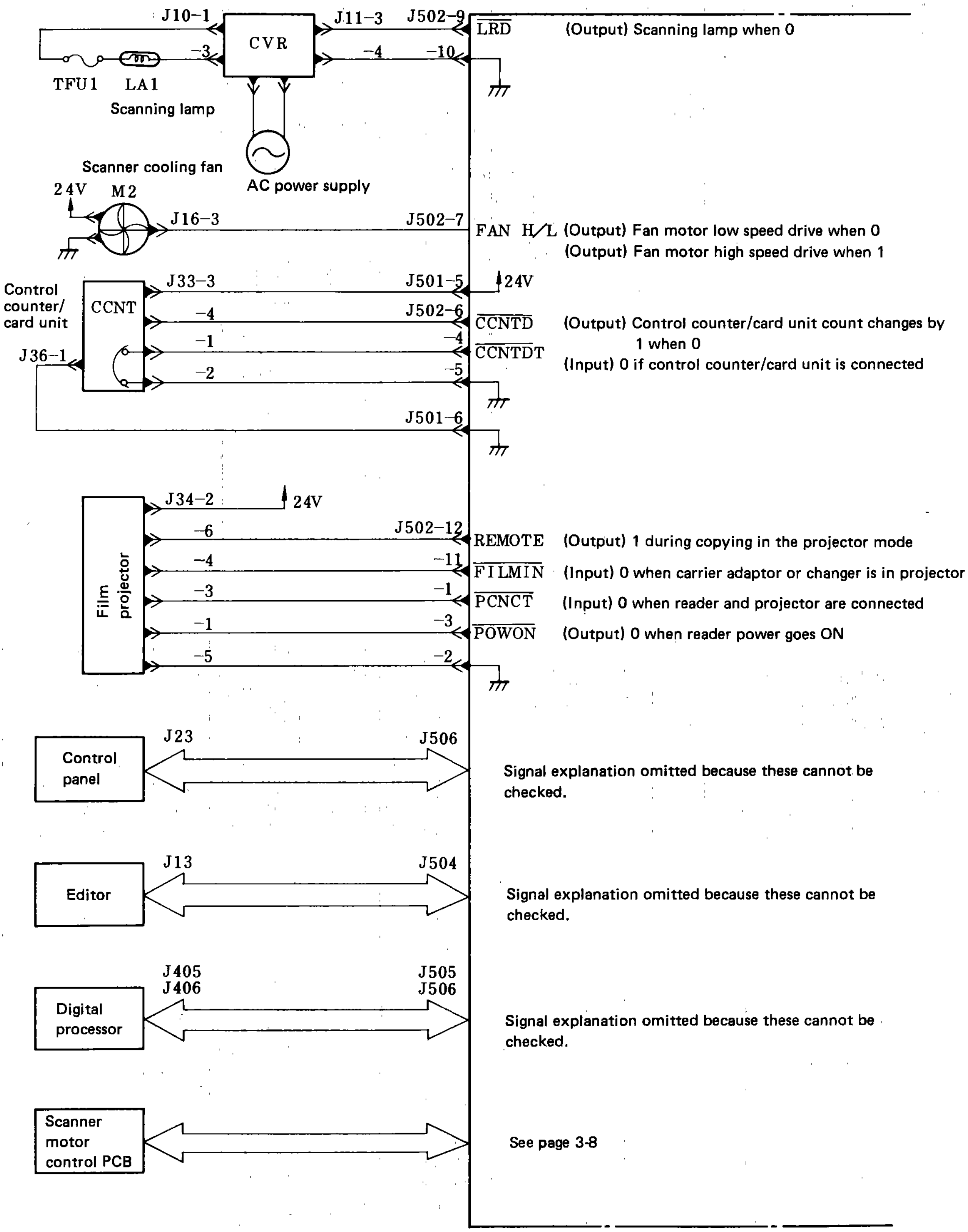

J10-1
-3
CVR
J11-3
-4
J502-9
-10
LRD
(Output) Scanning lamp when 0
TFU1
LA1
Scanning lamp
AC power supply
Scanner cooling fan
24V
M2
J16-3
J502-7
FAN H/L
(Output) Fan motor low speed drive when 0
(Output) Fan motor high speed drive when 1
Control counter/ card unit
CCNT
J33-3
-4
-1
-2
J36-1
J501-5
24V
J502-6
-4
-5
CCNTD
(Output) Control counter/card unit count changes by 1 when 0
CCNTDT
(Input) 0 if control counter/card unit is connected
J501-6
Film projector
J34-2
24V
-6
-4
-3
-1
-5
J502-12
-11
-1
-3
-2
REMOTE
(Output) 1 during copying in the projector mode
FILMIN
(Input) 0 when carrier adaptor or changer is in projector
PCNCT
(Input) 0 when reader and projector are connected
POWON
(Output) 0 when reader power goes ON
Control panel
J23
J506
Signal explanation omitted because these cannot be checked.
Editor
J13
J504
Signal explanation omitted because these cannot be checked.
Digital processor
J405
J406
J505
J506
Signal explanation omitted because these cannot be checked.
Scanner motor control PCB
See page 3-8

Figure 3-3

2. Scanner and Motor Control PCB Input/Output

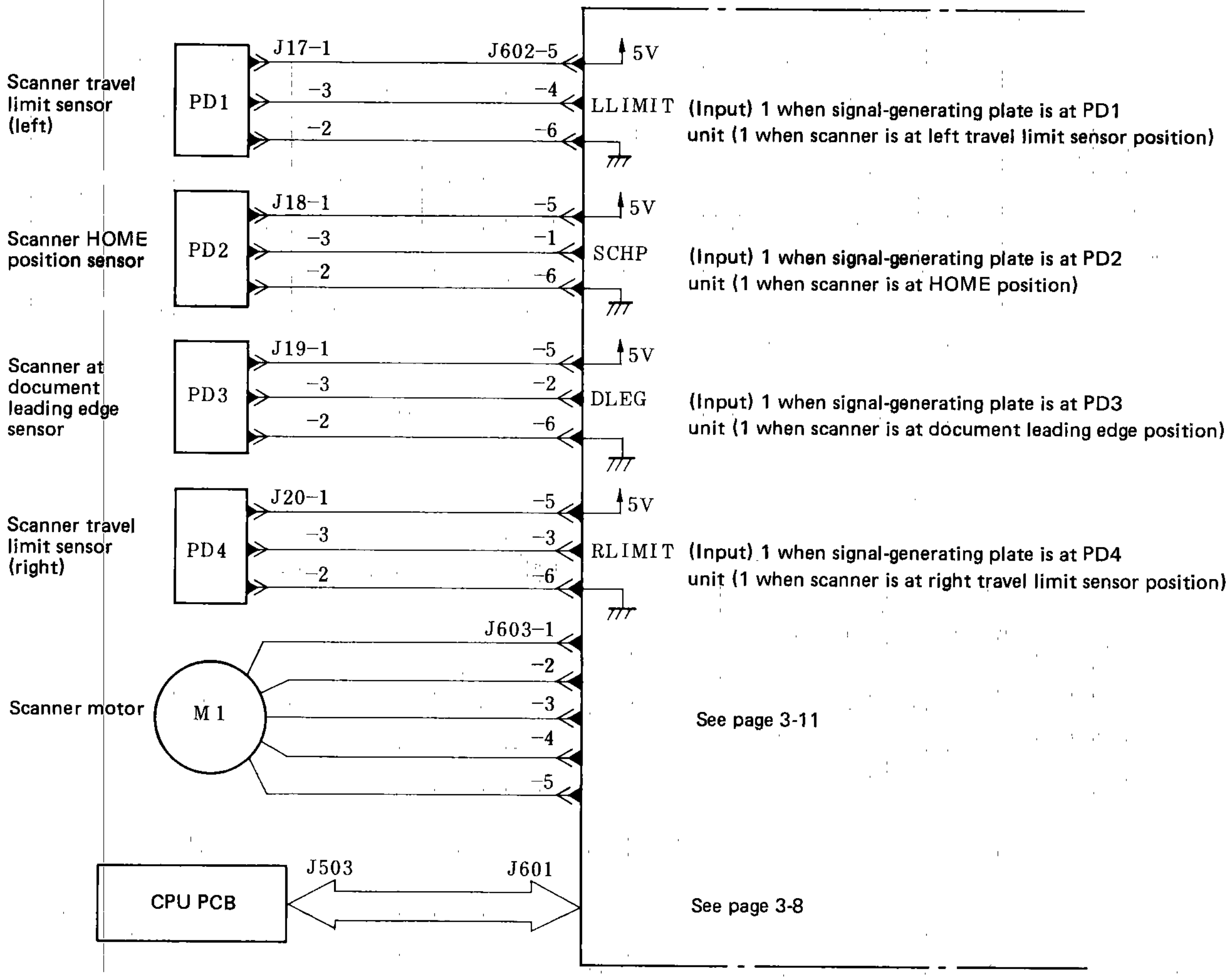

Scanner travel limit sensor (left)
PD1
J17-1
-3
-2
J602-5
-4
-6
5V
LLIMIT
(Input) 1 when signal-generating plate is at PD1 unit (1 when scanner is at left travel limit sensor position)
Scanner HOME position sensor
PD2
J18-1
-3
-2
-5
-1
-6
5V
SCHP
(Input) 1 when signal-generating plate is at PD2 unit (1 when scanner is at HOME position)
Scanner at document leading edge sensor
PD3
J19-1
-3
-2
-5
-2
-6
5V
DLEG
(Input) 1 when signal-generating plate is at PD3 unit (1 when scanner is at document leading edge position)
Scanner travel limit sensor (right)
PD4
J20-1
-3
-2
-5
-3
-6
5V
RLIMIT
(Input) 1 when signal-generating plate is at PD4 unit (1 when scanner is at right travel limit sensor position)
Scanner motor
M1
J603-1
-2
-3
-4
-5
See page 3-11
CPU PCB
J503
J601
See page 3-8

Figure 3-4

D. Basic Operation Sequence

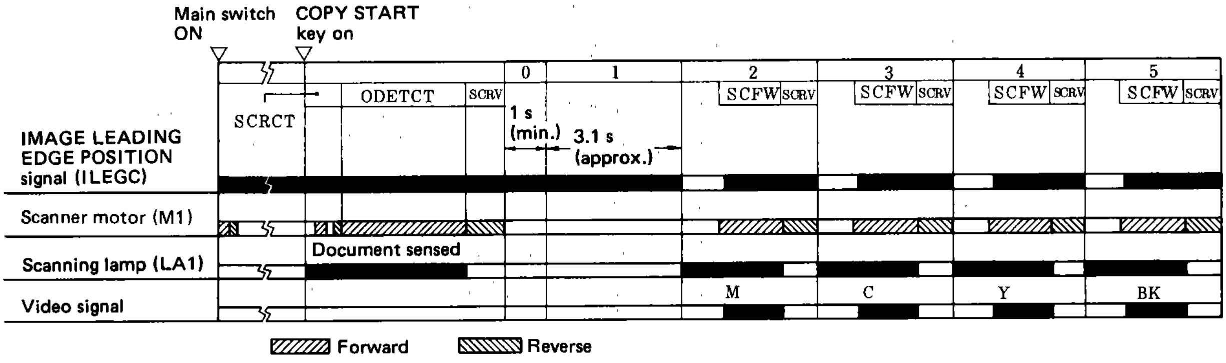

Main switch ON
COPY START key on
0
1
2
3
4
5
SCRCT
ODETCT
SCRV
SCFW
1 s (min.)
3.1 s (approx.)
IMAGE LEADING EDGE POSITION signal (ILEGC)
Scanner motor (M1)
Scanning lamp (LA1)
Document sensed
Video signal
M
C
Y
BK
Forward
Reverse

Figure 3-5 A4/Letter/full color/1 copy/document sensor ON

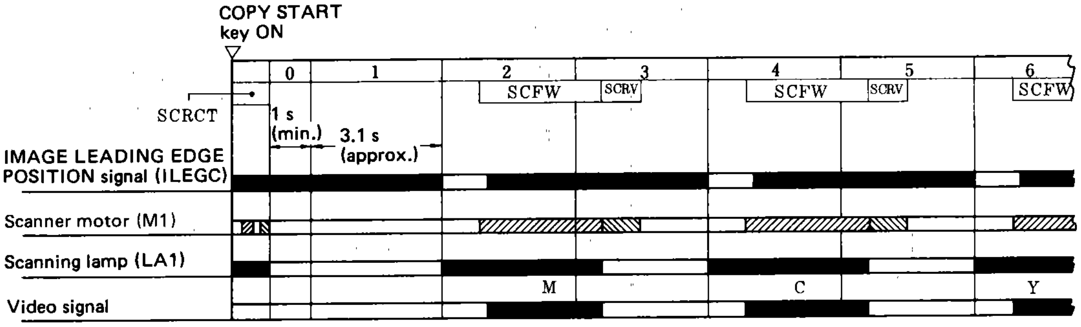

COPY START key ON
0
1
2
3
4
5
6
SCRCT
SCFW
SCRV
1 s (min.)
3.1 s (approx.)
IMAGE LEADING EDGE POSITION signal (ILEGC)
Scanner motor (M1)
Scanning lamp (LA1)
Video signal
M
C
Y

Figure 3-6 A3/Ledger/full color/1 sheet copy/document sensor OFF

Period		Operation	Remarks
SCRCT (Shading compensation)	Period in which scanner moves forward and backward for shading compensation measurement.	The scanner measures the density of the white plate for use in shading compensation.	
ODETCT (Document position sensing)	When document position sensing function has been selected; ODETCT is the initial period when scanner is moving forward. (Preparatory scan)	The document is illuminated by scanning lamp and the scanner moves forward 432 mm (vertical scanning direction) to determine the positions of the boundaries of the document.	· If document position sensing mode is not selected, this scanning operation is not performed.
SCFW (Scanner forward)	Period when scanner moves forward to scan the document.	The document is illuminated by the scanner lamp and the reflected optical image is projected onto the CCD.	
SCRV (Scanner reverse)	Period when scanner reverses.	The scanner returns to the home position.	

Table 3-1

E. Interface Signals

Figure 3-7 shows the interface signals between the reader and the printer used to exchange all data.

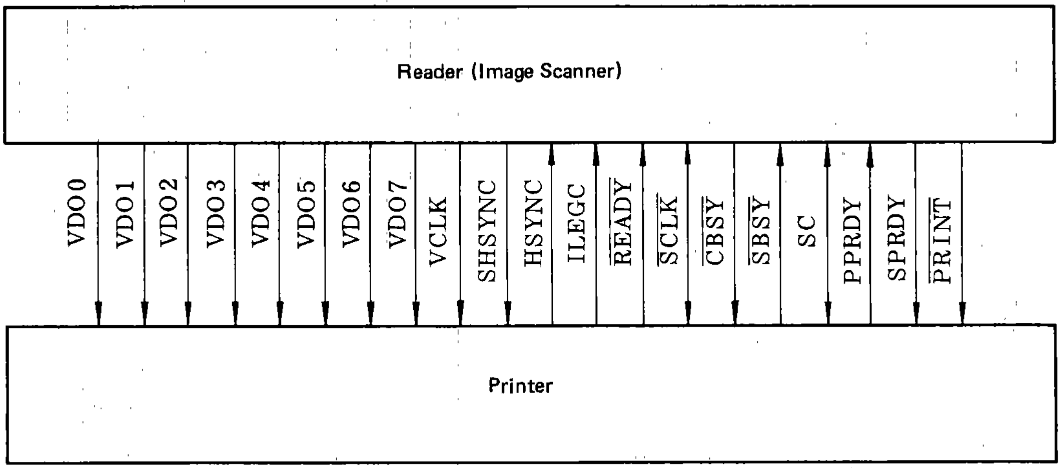


Figure 3-7

Abbreviation	Signal name	Explanation
VDO 7-0	VIDEO	The video (image data) signal from the reader unit.
VCLK	VIDEO CLOCK	The video (image) signal is sent from the scanner synchronized with this clock pulse signal.
SHSYNC	SCANNER HORIZONTAL SYNC	This is the horizontal synchronization signal generated by the reader. The reader transmits this signal to the printer to signal the start of transmission of the VDO signal.
HSYNC	HORIZONTAL SYNC	This is the horizontal synchronization signal generated by the printer in response to the BD signal. HSYNC causes the reader to generate the SHSYNC signal.
ILEGC	IMAGE LEADING EDGE POSITION	This is the reference signal for the image leading edge generated by the printer. The reader bases the scanner control signals on this signal.
$\overline{\text{READY}}$	READY	This signal becomes 0 when all printer conditions required for printing have been met.
$\overline{\text{SCLK}}$	SERIAL CLOCK	This is used as the sampling signal when the serial signal on the status command line ($\overline{\text{SC}}$) is to be converted to a parallel signal. It is outputted by the printer when it is outputting a status signal, and outputted by the reader when it is outputting a command.
$\overline{\text{CBSY}}$	COMMAND LINE BUSY	This signal indicates that the reader is outputting a serial signal via the status command line ($\overline{\text{SC}}$). It is 0 at such times.
$\overline{\text{SBSY}}$	STATUS LINE BUSY	This signal indicates that the printer is outputting a serial signal, via the status command line ($\overline{\text{SC}}$). It is 0 at such times.
S/C	STATUS OR COMMAND	The printer receives a STATUS REQUEST command from the reader via the status/command line, and returns a STATUS signal. Signals are serial and are read in synchronized with the SERIAL CLOCK signal $\overline{\text{SCLK}}$.
PPRDY	PRINTER POWER READY	This signal is 1 when the microprocessor of the printer has completed initial reset, and communication with the scanner has been enabled.
SPRDY	READER POWER READY	This signal is 1 when the microprocessor of the reader has completed initial reset, and communication with the printer has been enabled.
$\overline{\text{PRINT}}$	PRINT	This is the PAPER PICK-UP command from the reader. When it is 0 the printer picks up a sheet of paper.

Table 3-2

F. Generation of Horizontal and Vertical Synchronization signals

1. HORIZONTAL SYNCHRONIZATION signal (SHSYNC)

A timing signal is required to time the start of transmitting video signals from the reader to the printer. This function is provided by the HORIZONTAL SYNCHRONIZATION signal (SHSYNC) which is generated as follows.

Each time the laser beam (being swept across the drum) is reflected by the BD mirror, the DC controller produces a BEAM DETECT signal (BD).

The BD signal causes the DC controller to generate HORIZONTAL SYNCHRONIZATION signal HSYNC, which is then sent to the reader.

The digital processor PCB in the reader unit then generates SHSYNC synchronized with the reference clock pulse signal of the reader unit, and generates the video signals (VDO0 to 7) synchronized with the VCLK signal, both of which are sent to the printer.

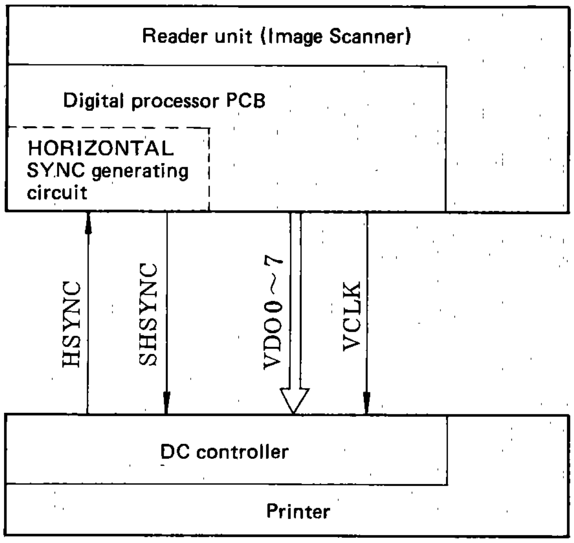

Reader unit (Image Scanner)
Digital processor PCB
HORIZONTAL SYNC generating circuit
HSYNC
SHSYNC
VDO0~7
VCLK
DC controller
Printer

Figure 3-8

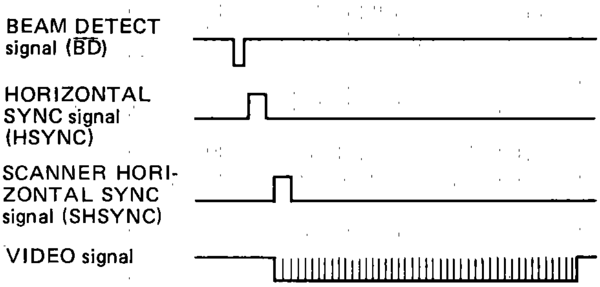

BEAM DETECT signal (BD)
HORIZONTAL SYNC signal (HSYNC)
SCANNER HORIZONTAL SYNC signal (SHSYNC)
VIDEO signal

Figure 3-9

2. VERTICAL SYNCHRONIZATION signal

The timing signal required for the reader (Image Scanner) unit to begin transferring the video signal (VDO0 to 7) to the printer at the correct point in the vertical scanning direction is based on the IMAGE LEADING EDGE POSITION signal (ILEGC) from the printer. When the reader receives ILEGC, the scanning lamp goes ON, and the scanner reads the document on the copyboard in compliance with settings made via the control panel (reproduction ratio, etc.), and sends the video signal to the printer.

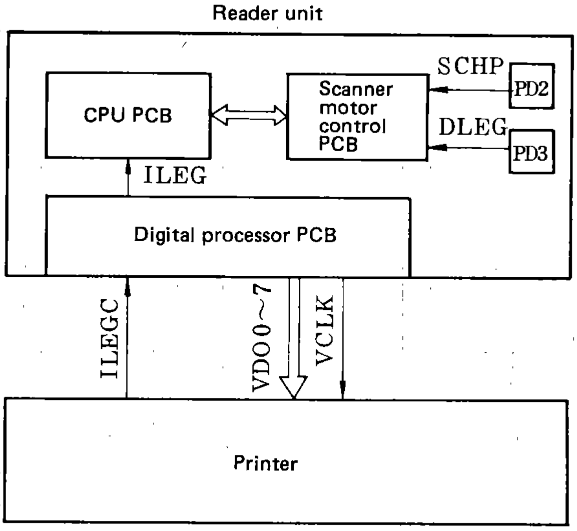

Reader unit
CPU PCB
Scanner motor control PCB
SCHP
PD2
DLEG
PD3
ILEG
Digital processor PCB
ILEGC
VDO0~7
VCLK
Printer

Figure 3-10

If there is to be no image shift on the copy paper in the subscan (vertical) direction, the scanner begins reading the document and the laser begins scanning the photosensitive drum simultaneously, so the leading edge of the document is reproduced at the leading edge of the copy.

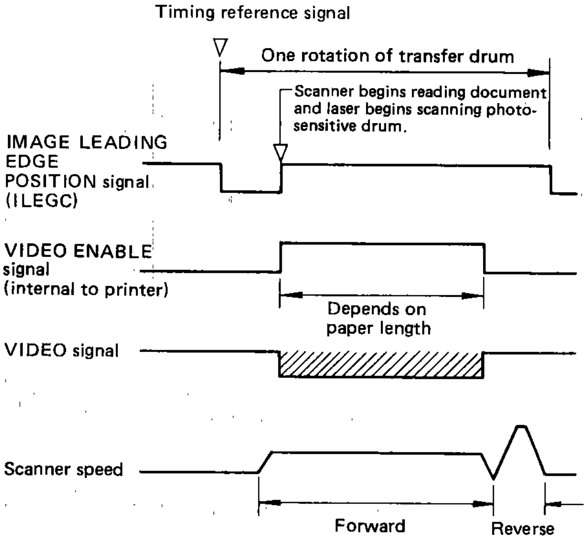

Timing reference signal
One rotation of transfer drum
Scanner begins reading document and laser begins scanning photosensitive drum.
IMAGE LEADING EDGE POSITION signal (ILEGC)
VIDEO ENABLE signal (internal to printer)
Depends on paper length
VIDEO signal
Scanner speed
Forward
Reverse

Figure 3-11

If the image is to be shifted toward the trailing edge of the paper (shift in subscan direction), the distance of the shift is converted into the equivalent number of HSYNC pulses by the CPU, and the start of scanner operation is delayed by that amount of time (modified if the reproduction ratio is not 100%).

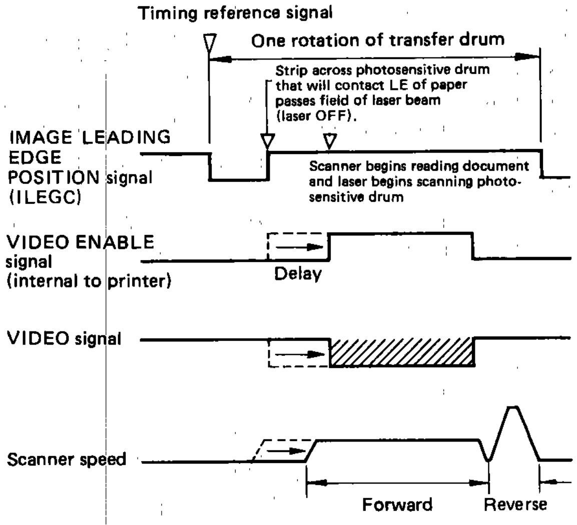

Timing reference signal
One rotation of transfer drum
Strip across photosensitive drum that will contact LE of paper passes field of laser beam (laser OFF).
IMAGE LEADING EDGE POSITION signal (ILEGC)
Scanner begins reading document and laser begins scanning photosensitive drum
VIDEO ENABLE signal (internal to printer)
Delay
VIDEO signal
Scanner speed
Forward
Reverse

Figure 3-12

If the image is to be shifted toward the leading edge of the paper (shift in subscan direction), the distance is converted into the equivalent number of HSYNC time divisions by the CPU, and the scanner moves the required distance along the document before scanning operation (generating image data signals) begins.

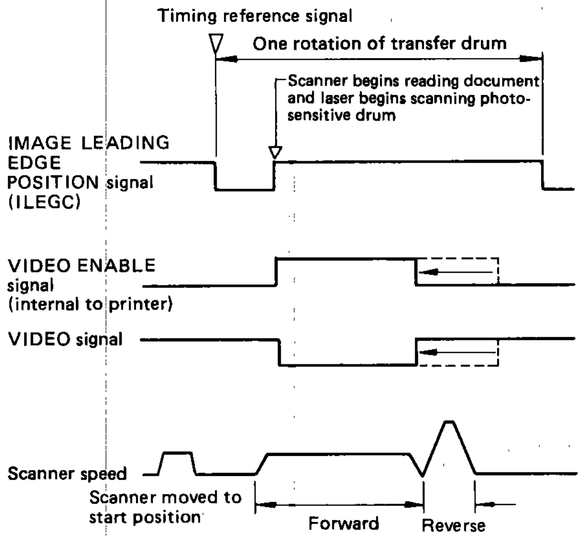

Timing reference signal
One rotation of transfer drum
Scanner begins reading document and laser begins scanning photosensitive drum
IMAGE LEADING EDGE POSITION signal (ILEGC)
VIDEO ENABLE signal (internal to printer)
VIDEO signal
Scanner speed
Scanner moved to start position
Forward
Reverse

Figure 3-13

II. EXPOSURE SYSTEM

A. Change of Reproduction Ratio

The reproduction ratio is changed in the horizontal scanning direction (parallel to the drum shaft) by skipping the signals for some CCD photocells (pixels) when the image signals are being written into the line memory for REDUCTION, or by repeated reading when they are being read out of the line memory for ENLARGEMENT.

The reproduction ratio in the vertical scan direction is changed by increasing (REDUCTION) or decreasing (ENLARGEMENT) the scanner speed.

B. Scanner Drive System

1. Outline

The circuit shown in Figure 3-14 controls the scanner motor. Its main functions are:

- Setting the direction of rotation
- Controlling motor speed

The direction of the motor changes to move the scanner forward and backward. The speed for moving the scanner forward is set to suit the reproduction ratio. The reverse speed is constant, independent of the reproduction ratio, and is four times the speed for DIRECT copying.

The scanner drive motor is a five-phase stepping motor.

Speed and direction are determined by the timing and polarity of drive pulses.

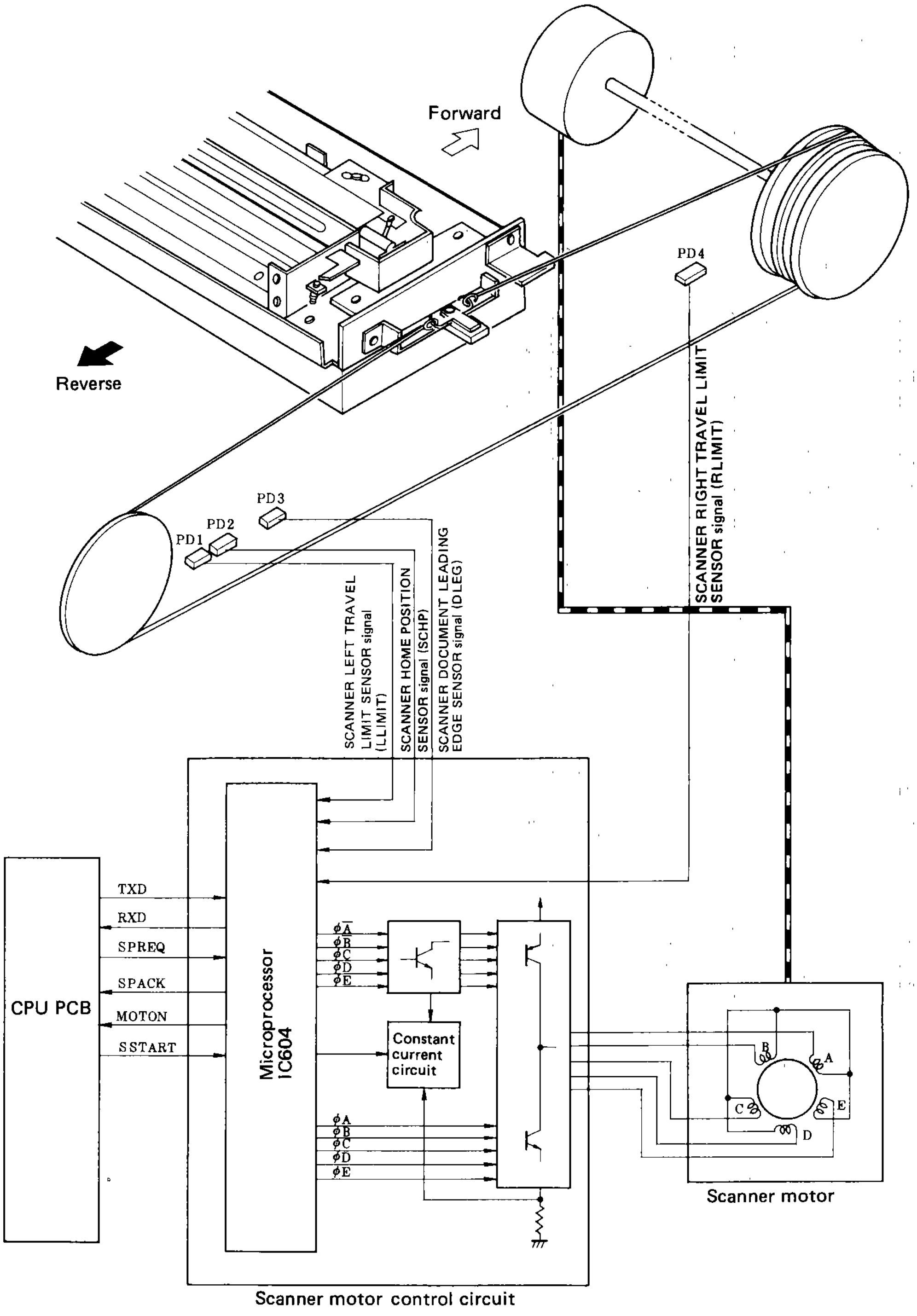

Forward
Reverse
PD4
PD3
PD2
PD1
SCANNER RIGHT TRAVEL LIMIT SENSOR signal (RLIMIT)
SCANNER LEFT TRAVEL LIMIT SENSOR signal (LLIMIT)
SCANNER HOME POSITION SENSOR signal (SCHP)
SCANNER DOCUMENT LEADING EDGE SENSOR signal (DLEG)
CPU PCB
TXD
RXD
SPREQ
SPACK
MOTON
SSTART
Microprocessor IC604
φA
φB
φC
φD
φE
Constant current circuit
φA
φB
φC
φD
φE
A
B
C
D
E
Scanner motor
Scanner motor control circuit

Figure 3-14

2. Relationship of Photosensors and Signals

Photo sensor	Signal name	Scanner		Purpose
		Moving in forward	Moving in reverse	
PD1	LLIMIT		↑	To stop scanner if its travel exceeds reverse limit
PD2	SCHP		↑	To stop scanner within approximately 7mm
PD3	DLEG	↑		Video signal initiation when there is no image reverse shift.
PD4	RLIMIT	↑		To stop scanner if its travel exceeds forward limit

Table 3-3

3. Scanner Basic Operations

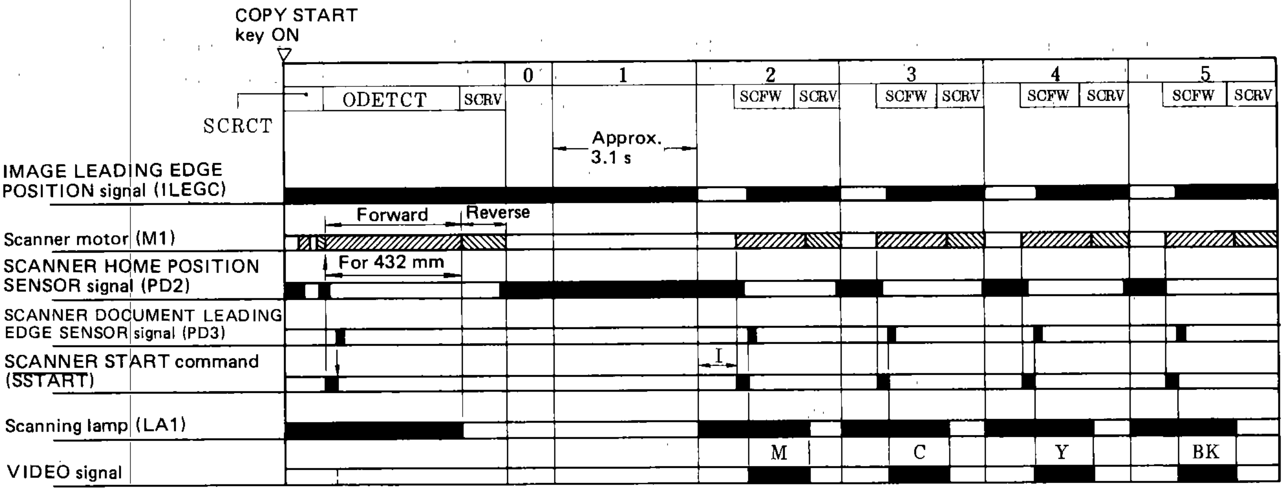

COPY START key ON
0
1
2
3
4
5
SCRCT
ODETCT
SCRV
SCFW
SCRV
Approx. 3.1 s
IMAGE LEADING EDGE POSITION signal (ILEGC)
Forward
Reverse
Scanner motor (M1)
SCANNER HOME POSITION SENSOR signal (PD2)
For 432 mm
SCANNER DOCUMENT LEADING EDGE SENSOR signal (PD3)
SCANNER START command (SSTART)
I
Scanning lamp (LA1)
VIDEO signal
M
C
Y
BK

Figure 3-15 A4/Letter/full color/one copy/DIRECT/document size/position sensing ON/ center shifting

Note I:
This time varies with the reproduction ratio set via the control panel and with the extent of image shift.

4. Scanner Operations for Forward Vertical Image Shift

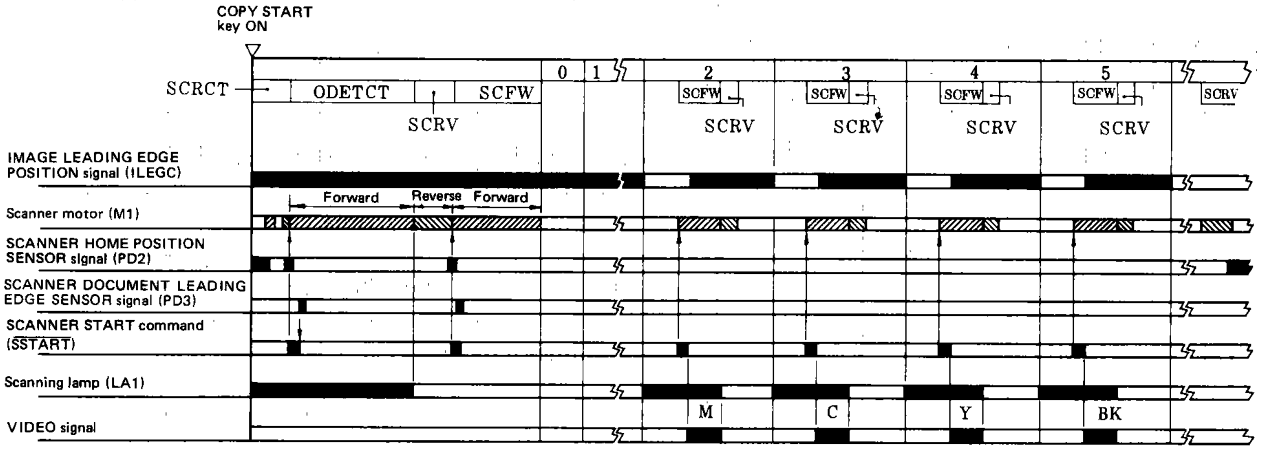

COPY START key ON
SCRCT
ODETCT
SCFW
SCRV
0
1
2
3
4
5
SCFW
SCRV
IMAGE LEADING EDGE POSITION signal (ILEGC)
Forward
Reverse
Forward
Scanner motor (M1)
SCANNER HOME POSITION SENSOR signal (PD2)
SCANNER DOCUMENT LEADING EDGE SENSOR signal (PD3)
SCANNER START command (SSTART)
Scanning lamp (LA1)
VIDEO signal
M
C
Y
BK

Figure 3-16 A4/Letter/full color/one copy/DIRECT/document size/position sensing ON/area specification/framing/image shift (forward)

Note:
The sequences of operations in Figure 3-16 produces changes of the type shown in Figure 3-17. An area has been specified and moved to the left side of the document and the rest of the original document has been made blank, then the finished product is printed on A4-size paper.

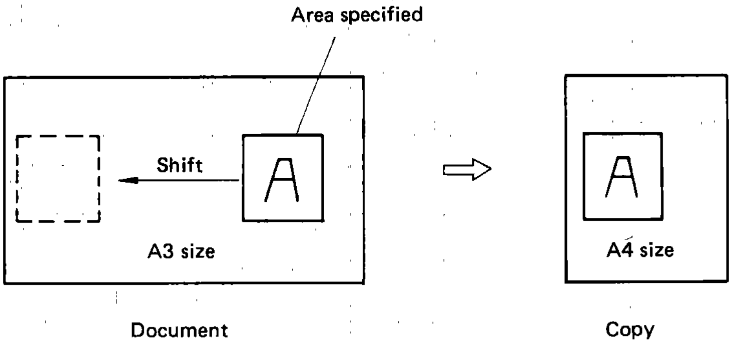

Area specified
Shift
A
A3 size
Document
A
A4 size
Copy

Figure 3-17

After the document position sensing operation has been completed, the scanner moves to the position corresponding to the image position before scanning the image, and scans the document using this position as the reference.

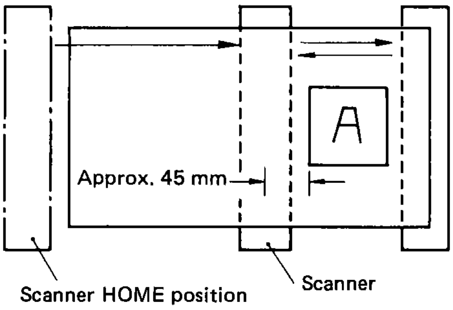
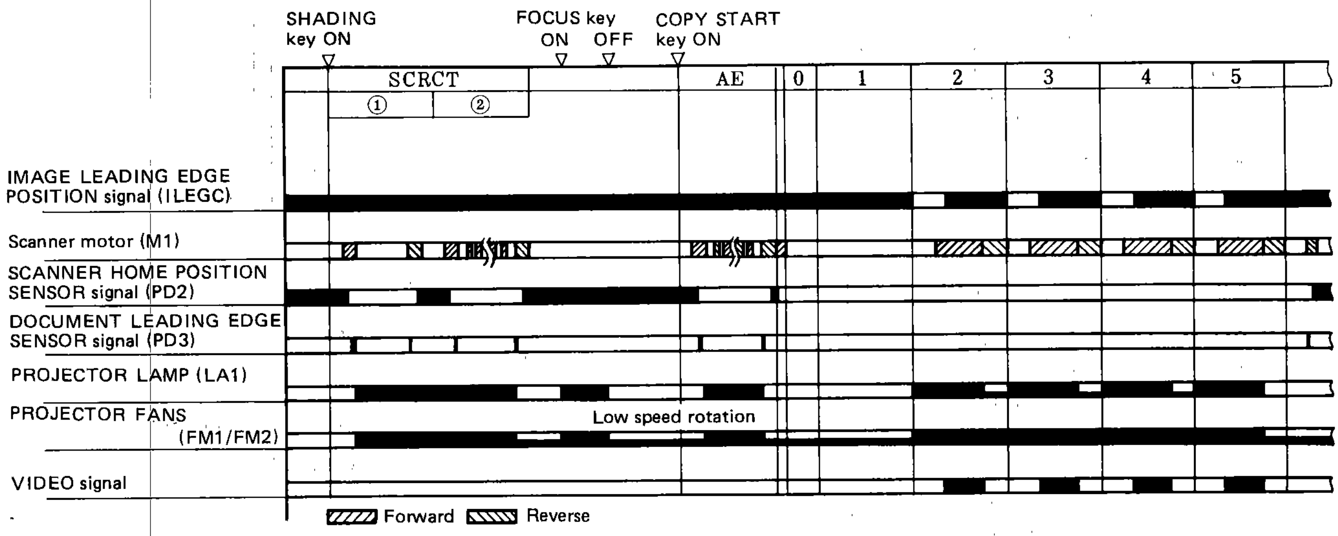

A
Approx. 45 mm
Scanner HOME position
Scanner

Figure 3-18

5. Scanner Operation when the projector is in use



① Adjustment of the white level between channels

② Measurement of the shading compensation value

Figure 3-19

6. Operation

a. General

The scanner motor is a 5-phase stepping motor. This type moves in very small steps, so it can move the scanner smoothly and assure that the scanner is positioned accurately.

The microprocessor of the scanner motor controller PCB (IC604) receives such instructions (serial signals) as scan distance, reproduction ratio, and direction of movement from the CPU on the CPU PCB (IC526) via the TXD line.

IC604 receives commands and sends back a status signal to IC526 via the RXD line.

When the SCANNER START command ($\overline{\text{SSTART}}$) from IC526 becomes 0, the scanner motor control PCB outputs drive pulses to the scanner motor field windings (see Figure 3-14) to drive it at the speed appropriate to the requirements (reproduction ratio, etc.). Motor speed is proportional to pulse frequency.

b. Forward rotation

When the drive (voltage) pulses are applied sequentially from phase A to phase E windings, as shown in Figure 3-20, the motor rotates forward. For REDUCTION copying, the motor should be driven faster by increasing the pulse frequency. This is shown in Figure 3-21.

c. Reverse motion

To reverse the motor, drive pulses are outputted to the windings in the reverse of the order for forward drive. (See Figure 3-22.)

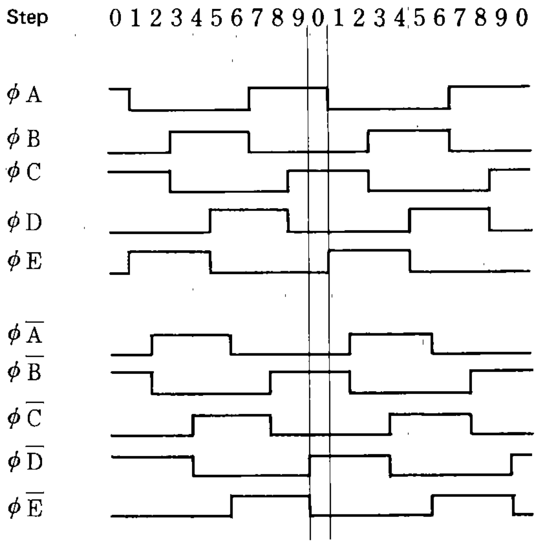


Figure 3-20 Drive pulses for DIRECT copying (forward)

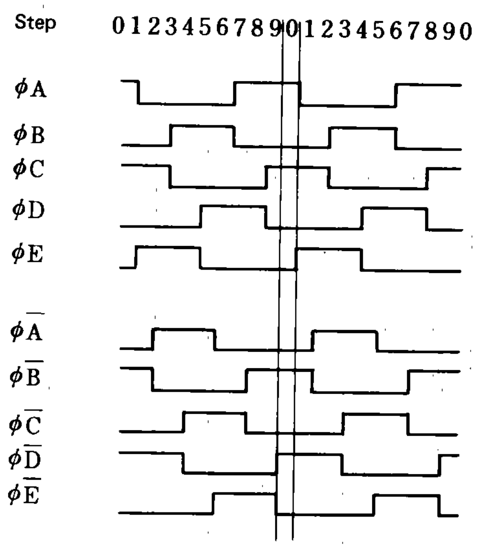

Step
01234567890123456789 0
φA
φB
φC
φD
φE
φĀ
φB̄
φC̄
φD̄
φĒ

Figure 3-21 Drive pulses for REDUCTION copying (forward)

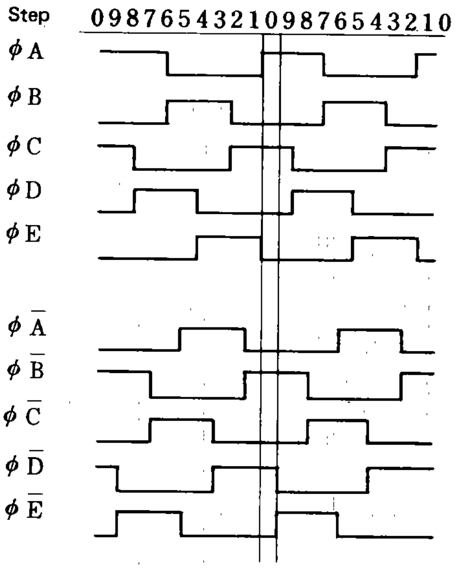

Step
09876543210987654321 0
φA
φB
φC
φD
φE
φĀ
φB̄
φC̄
φD̄
φĒ

Figure 3-22 Drive pulses for reverse

C. Switching Scanning Lamp On/Off

1. Operation

When $\overline{LRD}$ = 1, no power is supplied to scanning lamp LA1 (lamp OFF).

When $\overline{LRD}$ = 0, power is supplied to scanning lamp LA1, (lamp ON).

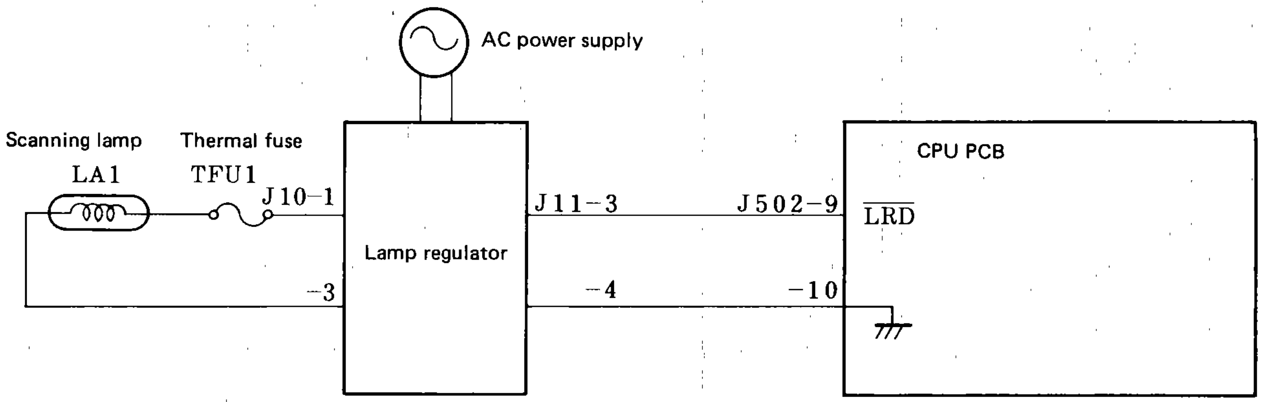

AC power supply
Scanning lamp
LA1
Thermal fuse
TFU1
J10-1
-3
Lamp regulator
J11-3
-4
J502-9
-10
CPU PCB
LRD

Figure 3-23

III. IMAGE PROCESSING SYSTEM

A. CCD and CCD Driver

1. General

The charge-coupled device (CCD) used in the Laser Color copier has five strips of about 3000 photocells each, positioned end to end. Each cell has a blue, green, or red filter in the light path, the filters repeating regularly: b, g, r, b, g, r...... Each photocell generates the signal for one pixel (picutre element) and three photocells (b,g,r) generate the color information for one small area. This is equivalent to about 5000 b.g.r sensing units, so the resolution on paper up to 297 mm (8.5 inches) wide, is 16 three-color dots/mm.

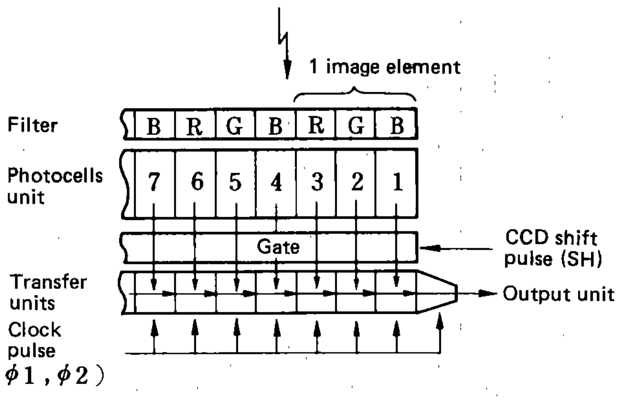

1 image element
Filter
B R G B R G B
Photocells unit
7 6 5 4 3 2 1
Gate
CCD shift pulse (SH)
Transfer units
Output unit
Clock pulse
(φ1, φ2)

Figure 3-24

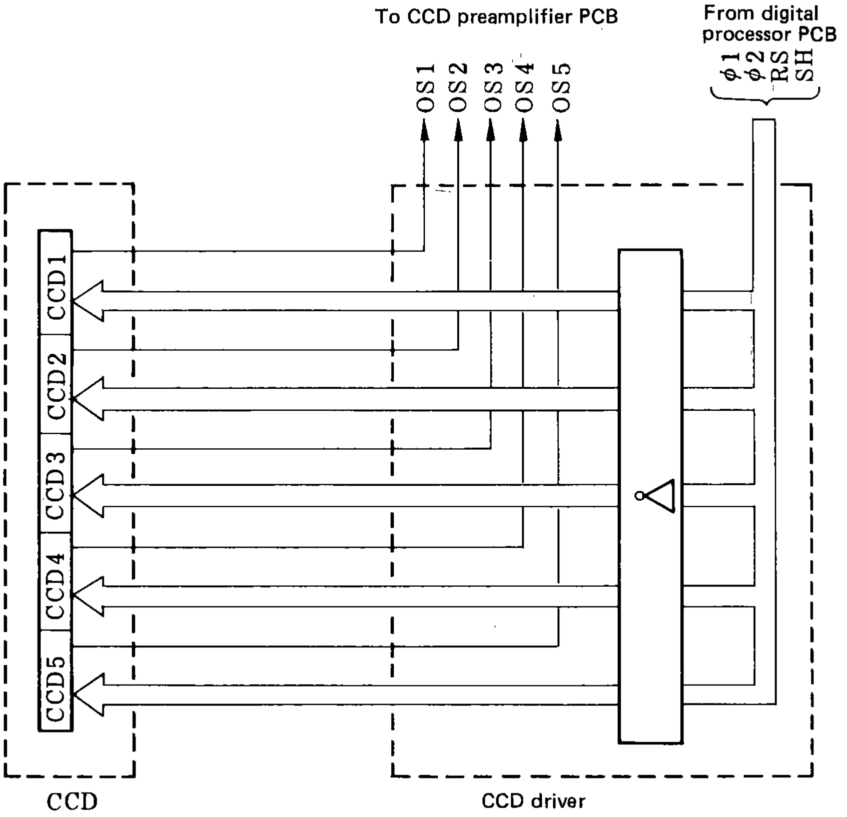

To CCD preamplifier PCB
From digital processor PCB
φ1
φ2
RS
SH
OS1
OS2
OS3
OS4
OS5
CCD1
CCD2
CCD3
CCD4
CCD5
CCD
CCD driver

Figure 3-25

2. CCD photocell unit

Each photocell of the CCD is 20 × 62.5 μm, and is connected to its own capacitor and switch, as represented by Figure 3-26. For each cycle, the capacitor (C1) begins with zero charge. When light strikes the photocell (photodiode PD), electrons are removed from the top plate of C1, thus putting a (+) charge on the top plate. The charge Q is proportional to the intensity of the light striking PD.

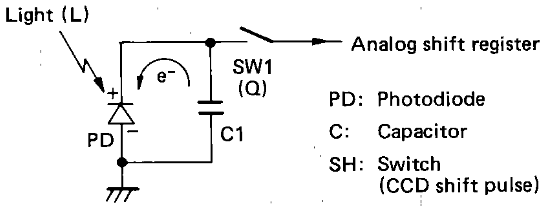

Light (L)
e⁻
+
−
PD
SW1
(Q)
C1
Analog shift register
PD: Photodiode
C: Capacitor
SH: Switch
(CCD shift pulse)

Figure 3-26

3. CCD analog shift register (transfer unit)

At the end of the cycle, switch SH is closed and the charge (Q) on C1 is transferred by the analog shift register (ASR) to the output unit.

The charge of the capacitor of every photocell unit is transferred to the ASR simultaneously, then the charges are transferred sequentially by the ASR.

Each is outputted in turn (serial signal) by the output unit.

4. CCD output unit

Each charge is transferred in turn by the ASR to the capacitor (C2) of the output unit. The charge is converted to an equivalent voltage by the source-follower FET of the output unit and outputted as a serial signal. Afterward, SW2 opens and RS closes momentarily to reset C2 for the next cycle.

Operation of switches SW1 and SW2, and shifting of charges by the ASR, are in response to timing signals $\phi 1$ and $\phi 2$.

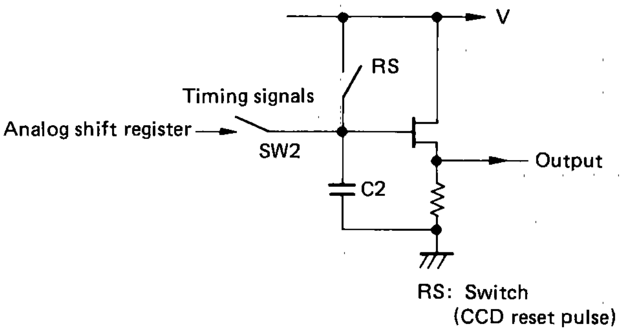


Figure 3-27

Figure 3-28 shows the timing chart for clock pulses 1 and 2, reset pulse RS, and the CCD output.

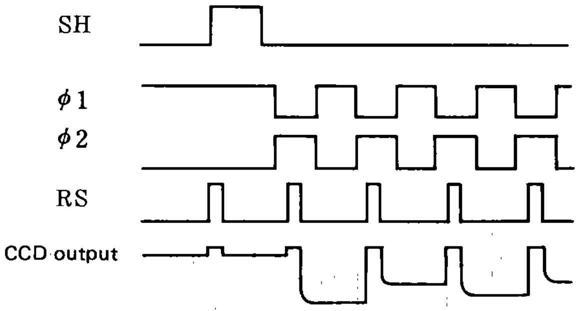


Figure 3-28

Each of the pulses $\phi 1$, $\phi 2$, RS, and SH is inputted from the digital processor PCB. The CCD reads in one line at a time, in response to shift pulse SH. SH is generated by HORIZONTAL SYNC signal SHSYNC.

B. Analog Image Processing Circuit

This circuit consists of the CCD preamplifier PCB and the analog processor PCB, and performs various analog processing on the output from the CCD unit.

a. CCD preamplifier PCB

The CCD preamplifier circuit has two functions.

- Eliminating DC component
- Amplification

The output from the CCD is a fluctuating DC signal. The AC component of signals OS1-OS5 (Figure 3-29) is passed by the coupling capacitors and amplified by a constant.

b. Analog processor PCB

The analog processor circuit has two functions.

- Equalizing BGR photocell outputs
- A/D conversion

The five sets of video signals inputted to the analog processor PCB are first equalized.

The signals from the photocells for B, G and R are brought to the same base level to compensate for inherent differences in analog signal output from the photocells for each color.

The base level (multiplication factor) for each of the three colors in each of the five CCD systems can be adjusted individually.

The five video signals inputted to the A/D converter are individually converted into 8-bit digital signals and outputted to the digital processor PCB.

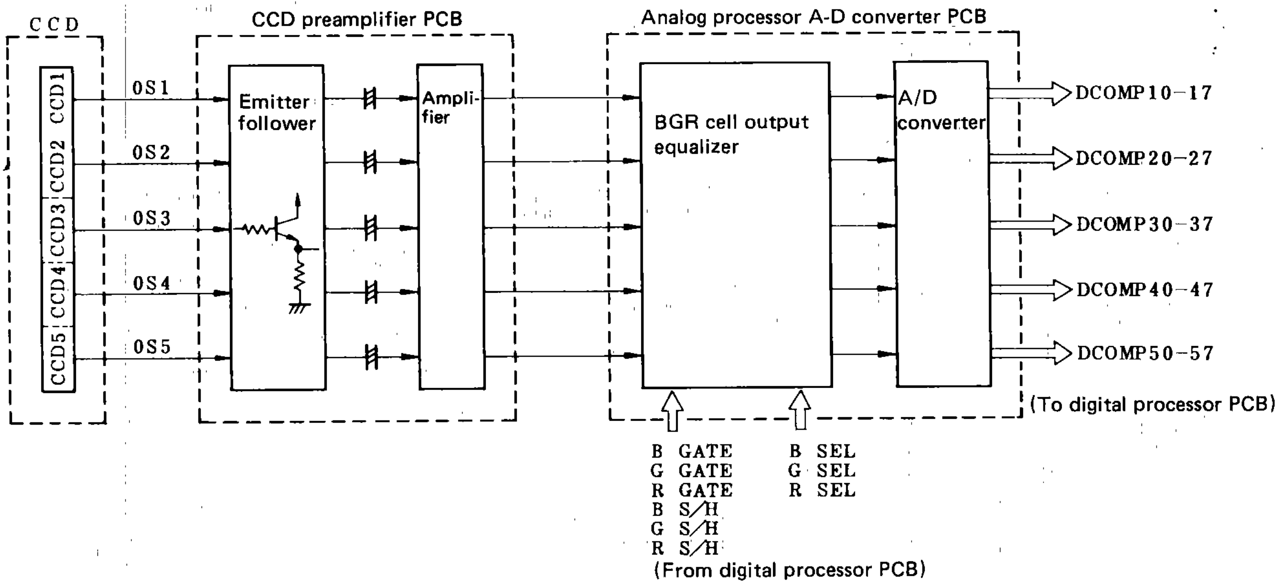

CCD
CCD1
CCD2
CCD3
CCD4
CCD5
OS1
OS2
OS3
OS4
OS5
CCD preamplifier PCB
Emitter follower
Ampli-fier
Analog processor A-D converter PCB
BGR cell output equalizer
A/D converter
DCOMP10-17
DCOMP20-27
DCOMP30-37
DCOMP40-47
DCOMP50-57
(To digital processor PCB)
B GATE
G GATE
R GATE
B S/H
G S/H
R S/H
B SEL
G SEL
R SEL
(From digital processor PCB)

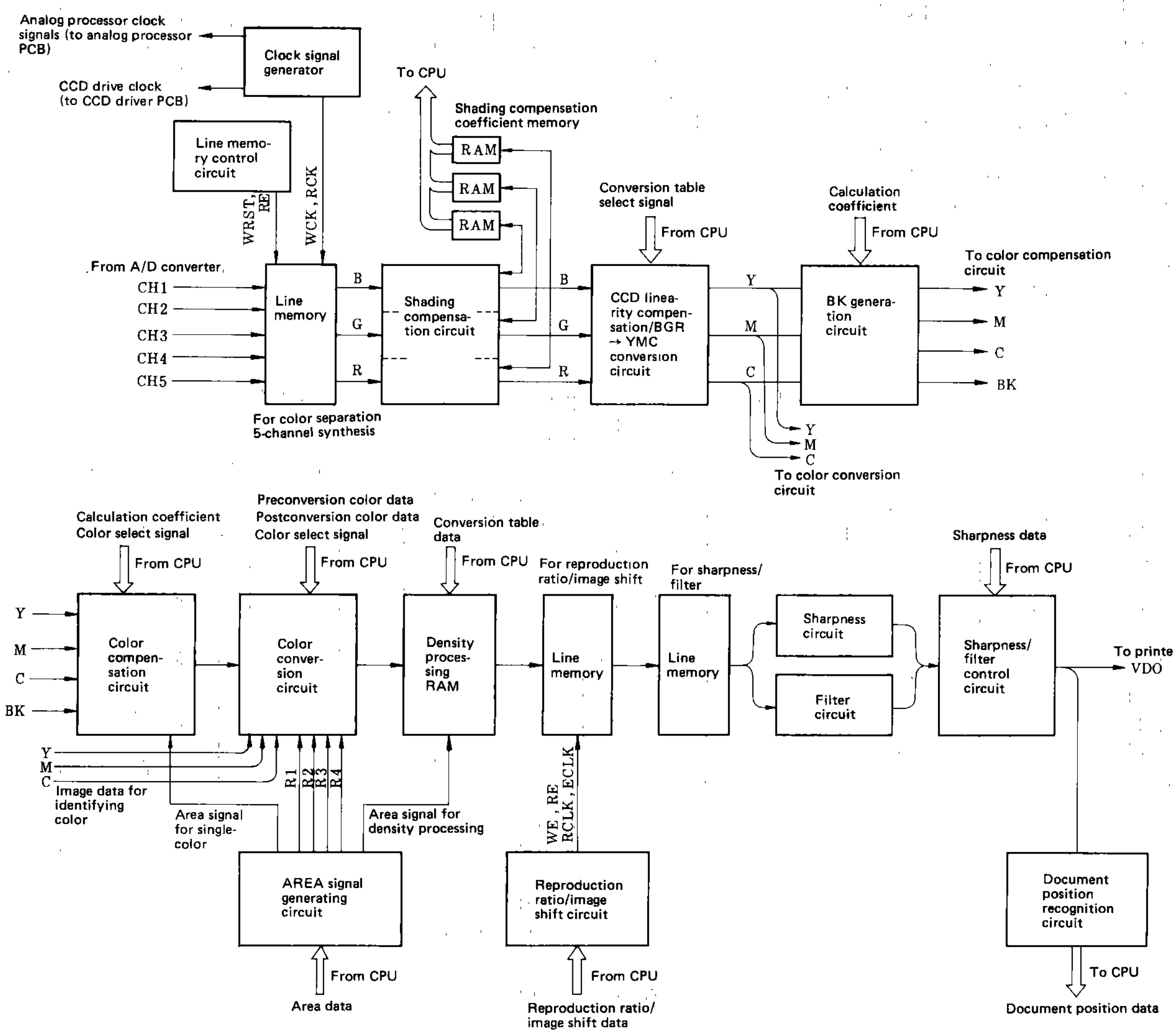
Figure 3-29

C. Digital Image Processing Circuit

1. General

The circuit shown in Figure 3-30 performs various compensation and image processing operations on the digital image signals outputted by the A/D converter. The main operations are:

- Color separation/5-channel synthesis
- Shading compensation
- CCD linearity compensation/BGR → YMC conversion
- Black generation
- Color compensation
- Color conversion
- Density processing
- Reproduction ratio/imageshift processing


Analog processor clock signals (to analog processor PCB)
CCD drive clock (to CCD driver PCB)
Clock signal generator
To CPU
Shading compensation coefficient memory
RAM
RAM
RAM
Line memory control circuit
WRST, RE
WCK, RCK
Conversion table select signal
From CPU
Calculation coefficient
From CPU
From A/D converter
CH1
CH2
CH3
CH4
CH5
Line memory
B
G
R
Shading compensation circuit
B
G
R
CCD linearity compensation/BGR → YMC conversion circuit
Y
M
C
BK generation circuit
To color compensation circuit
Y
M
C
BK
For color separation 5-channel synthesis
Y
M
C
To color conversion circuit
Calculation coefficient
Color select signal
From CPU
Preconversion color data
Postconversion color data
Color select signal
From CPU
Conversion table data
From CPU
For reproduction ratio/image shift
For sharpness/filter
Sharpness data
From CPU
Y
M
C
BK
Color compensation circuit
Color conversion circuit
Density processing RAM
Line memory
Line memory
Sharpness circuit
Filter circuit
Sharpness/filter control circuit
To printer
VDO
Y
M
C
Image data for identifying color
R1
R2
R3
R4
Area signal for single-color
Area signal for density processing
WE, RE
RCLK, ECLK
AREA signal generating circuit
Reproduction ratio/image shift circuit
Document position recognition circuit
From CPU
Area data
From CPU
Reproduction ratio/image shift data
To CPU
Document position data

R1, R2, R3: Area signal for color conversion/painting
R4: Area signal for framing/blanking

Figure 3-30 Digital image processing circuit

2. Color Separation/Five-channel Synthesis

This circuit contains 15 line memories (three for each of the five channels) as shown in Figure 3-31. It has the following two write and read operations.

a. Writing

Separates the image signals from the five A/D converters into blue, green, and red components and writes them into the 15 line memories timed by the write clock pulses BWCK, GWCK, and RWCK from the clock signal generator.

b. Reading

Reads horizontal scan image data for blue, green and red out of the line memory in individual streams for each color.

Three streams of image signals (blue, green and red) are simultaneously read out of line memory. Within each stream readout starts with channel 1, in response to the five READ ENABLE signals ($\overline{RE1}$ to $\overline{RE5}$) outputted by the line memory control circuit.

The combined data of channesl 1-5 become data for one scanning line of the final print. This is five-channel synthesis.

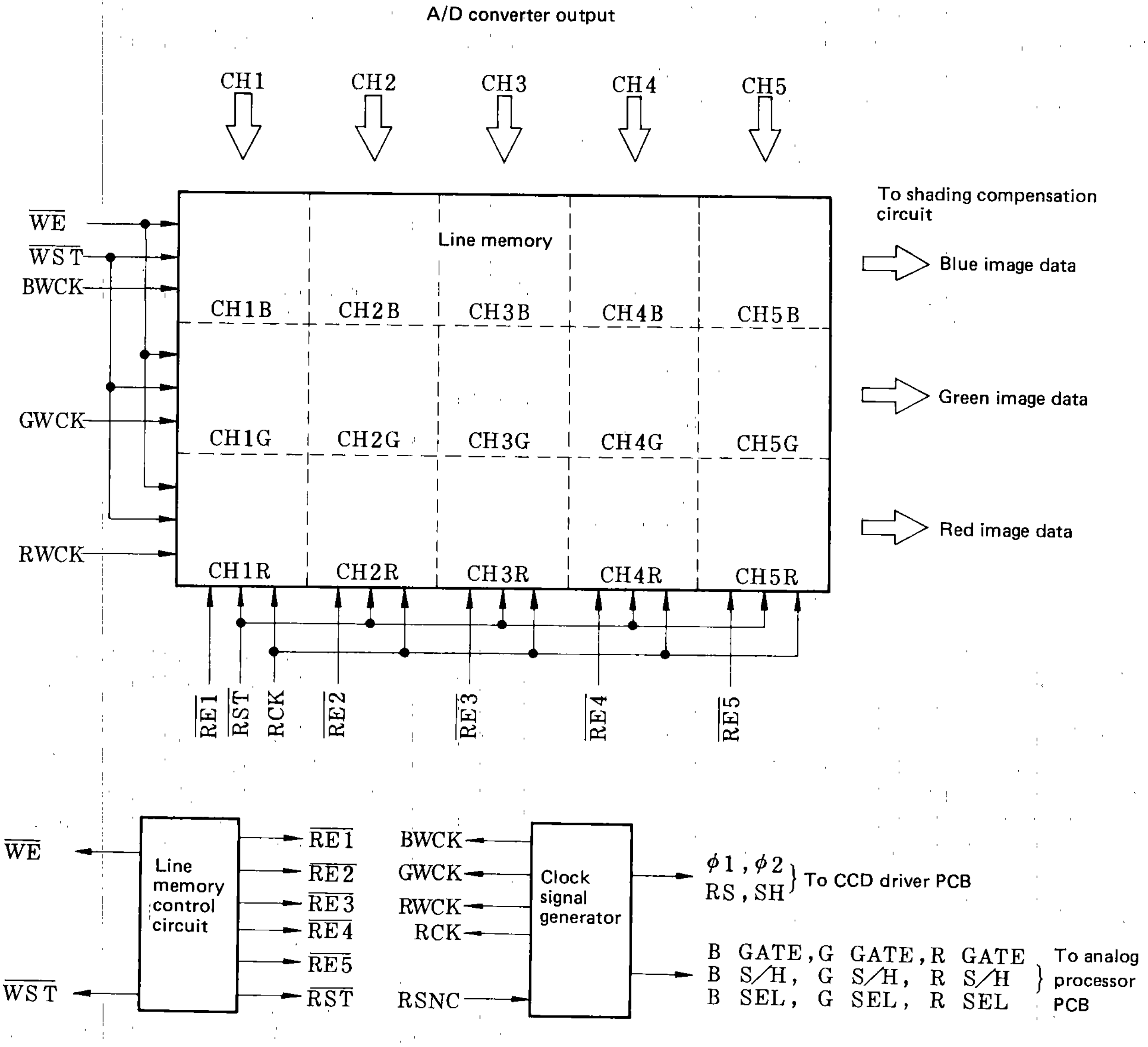

A/D converter output
CH1
CH2
CH3
CH4
CH5
Line memory
WE
WST
BWCK
GWCK
RWCK
CH1B
CH2B
CH3B
CH4B
CH5B
CH1G
CH2G
CH3G
CH4G
CH5G
CH1R
CH2R
CH3R
CH4R
CH5R
To shading compensation circuit
Blue image data
Green image data
Red image data
RE1
RST
RCK
RE2
RE3
RE4
RE5
WE
WST
Line memory control circuit
RE1
RE2
RE3
RE4
RE5
RST
BWCK
GWCK
RWCK
RCK
RSNC
Clock signal generator
φ1, φ2
RS, SH
To CCD driver PCB
B GATE, G GATE, R GATE
B S/H, G S/H, R S/H
B SEL, G SEL, R SEL
To analog processor PCB

Figure 3-31 Color separation/5-channel synthesis circuit

3. Shading Compensation

Figure 3-32 is a block diagram of one shading compensation circuit. There are three of these circuits, one each for the blue, green and red image signals. The circuit for the blue data will be described here. To simplify the explanation, image signal switching will be indicated by a switch SW.

The CPU switches the scanning lamp ON, switches SW to the 2 side, and causes the scanner to move to a position under the standard white sheet underneath the copyboard, a surface of uniform reflectance. The response (signal output, Bw) to this surface by each cell of the CCD is recorded in RAM.

When a document is being scanned, to SW is set to 1 so the signal goes to the arithmetic circuit unchanged. The data from RAM of CCD cell characteristics are also read into the arithmetic circuit, and are used to correct each bit of data from the scanning operation in order to correct any non-linearity of CCD response.

$$Bo = Bi \times \frac{1}{Bw} \times 255^{*}$$

*: The standard output (255) can be changed by <DOC B-LEV> in the service mode.

Reference:
In the color conversion mode, if the color before conversion (or the color after conversion) is identified (specified) by reading an area of the document of that color, the CPU uses this RAM as the source of data regarding the specified color.

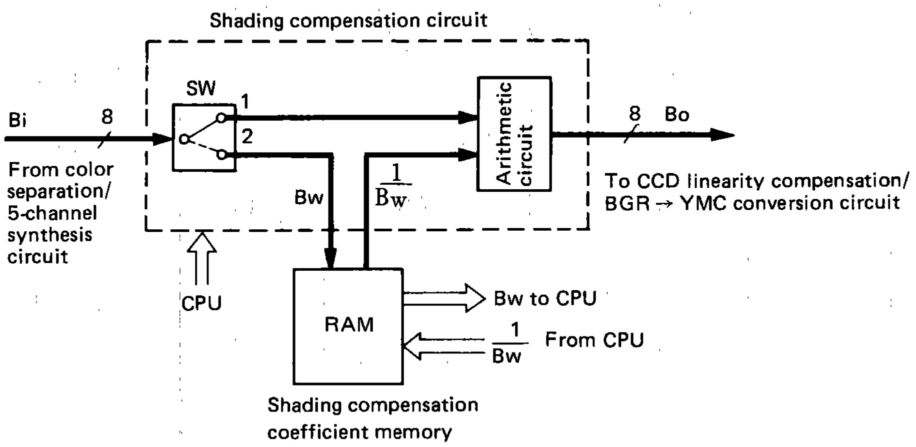

Shading compensation circuit
SW
1
2
Bi
8
From color separation/ 5-channel synthesis circuit
Bw
1/Bw
Arithmetic circuit
8
Bo
To CCD linearity compensation/ BGR → YMC conversion circuit
CPU
RAM
Bw to CPU
1/Bw
From CPU
Shading compensation coefficient memory

Figure 3-32 Shading compensation circuit

4. CCD Linearity Comensation/BGR → YMC Conversion

Figure 3-33 shows the CCD linearity compenstion/BGR → YMC conversion circuit. There is one of these for each color signal, but only the blue data circuit will be described here.

This circuit consists of a ROM containing seven predetermined conversion tables. One of the conversion tables is used for a normal paper document; the other six are used when using the Projector. Selection is made by the CPU.

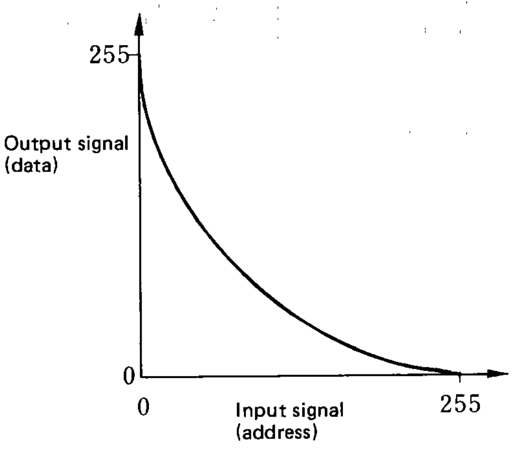


Figure 3-33 Conversion table

The 8-bit image signal is used as a ROM address signal, and the 8-bit data stored at that address is then outputted by the ROM. The addresses numbered 0 to 255 and the data at that address are related as shown by Figure 3-33 (a conversion table for copying a normal paper document). Both linearity compensation and blue → yellow conversion are performed at the same time.

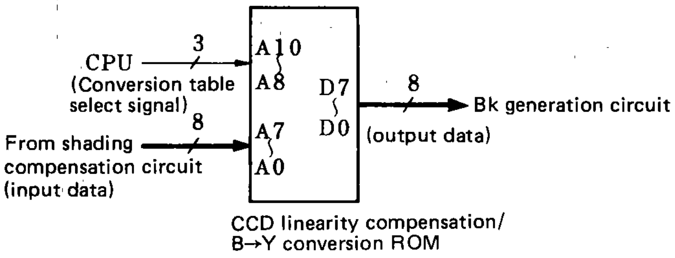

CPU
(Conversion table select signal)
3
From shading compensation circuit (input data)
8
A10 ~ A8
A7 ~ A0
D7 ~ D0
8
Bk generation circuit
(output data)
CCD linearity compensation/ B→Y conversion ROM

Figure 3-34 CCD linearity compensation/
BGR → YMC conversion circuit

5. Black Generation

Figure 3-35 is a block diagram of the black generation circuit . This circuit generates the black signal and converts the yellow, magenta, and cyan image signals into yellow, magenta, cyan, and black image signals.

First, the comparator obtains the minimum value of Y, M, and C of all the data in the input signals Yi, Mi, and Ci, and generates the black signals βMin (YMC) using the coefficient β set by the CPU. Next, the subtraction circuit subtracts βMin (YMC) from Yi, Mi, and Ci to produce the output signal Yo, Mo, and Co.

Note:
In both three-color and single-color copying, the comparator does not output βMin (YMC).

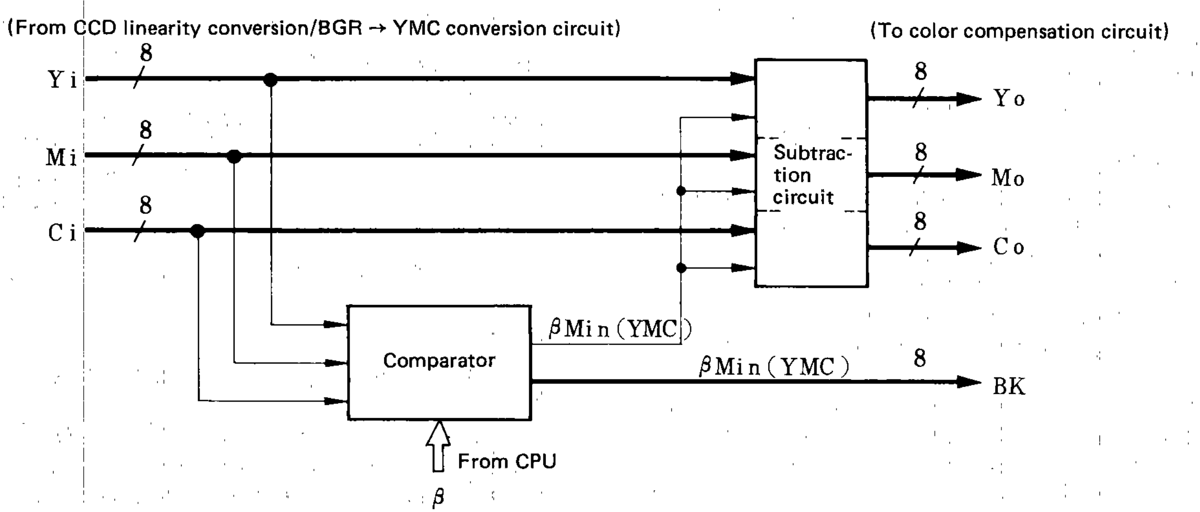

(From CCD linearity conversion/BGR → YMC conversion circuit)
(To color compensation circuit)
Yi
Mi
Ci
8
8
8
Subtraction circuit
8
8
8
Yo
Mo
Co
Comparator
βMin (YMC)
βMin (YMC)
8
BK
From CPU
β

Figure 3-35 Black generation circuit

6. Color Compensation

Figure 3-36 is a block diagram of the color compensation circuit. This circuit compensates for the spectral characteristics of the filters of the CCD photocells and the toner of the printer, and outputs the image signal for the color then being reproduced by the printer (yellow, magenta, cyan or black).

Each of the five multiplication coefficients stored in registers of the color compensation circuit can be selected by a COLOR SELECT signal from the CPU (via the selector). For copying in three of four colors, each of the color SELECT signals is sent in turn when its color is being reproduced by the printer. The multiplication coefficient is then sent to the multiplication circuit.

The CPU can also issue two color select signals (color select signal A/B), and then one of these is selected according to the area signal. This is how operations like copying single color copy in a specified area are performed.

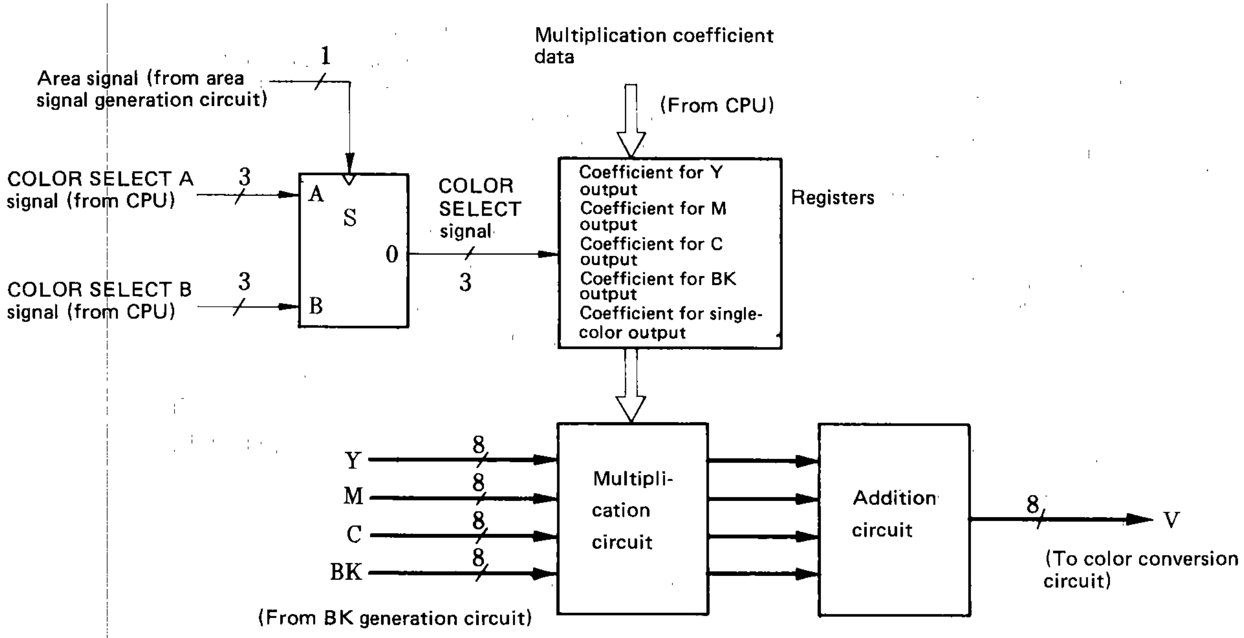

Area signal (from area signal generation circuit)
1
COLOR SELECT A signal (from CPU)
3
COLOR SELECT B signal (from CPU)
3
A
S
B
0
COLOR SELECT signal
3
Multiplication coefficient data
(From CPU)
Coefficient for Y output
Coefficient for M output
Coefficient for C output
Coefficient for BK output
Coefficient for single-color output
Registers
Y
M
C
BK
8
8
8
8
(From BK generation circuit)
Multiplication circuit
Addition circuit
8
V
(To color conversion circuit)

Figure 3-36 Color compensation circuit

7. Color Conversion

a. General

Figure 3-37 shows the block diagram of the color conversion circuit. This circuit can perform the following processing.

- Conversion to specified color
- Painting
- Framing
- Blanking

This circuit performs the above operations on the video image signal (Vi) in response to the following data from the CPU.

- Preconversion color data
- Postconversion color data
- AREA signal outputted by the AREA signal generating unit
- Image data for identifying color outputted by the CCD linearity compensation/BGR → YMC conversion circuit

b. Specified color conversion

The procedure for converting a specified color within a given area to a different color is as follows.

First the scanner moves to the location on the document with the color to be changed. The CPU reads the data of the color image from the RAM of the shading compensation circuit for that point, and sets this as the preconversion color data.

Next, the desired new color is specified either from certain fixed colors, or by specifying a point on the original with the desired color and reading the color data for that area out of memory. This becomes the postconversion color data.

The color identification unit compares the color identification image data YMC being generated during a scanning operation with the preconversion color data. If they are approximately the same it outputs COLOR IDENTIFIED signal D.

When both the AREA signal R and COLOR IDENTIFIED signal D are being outputted, the selector selects the post conversion color data to be used as output Vo. At all other times image input signal Vi is selected to be Vo.

These signals are shown in Figure 3-38.

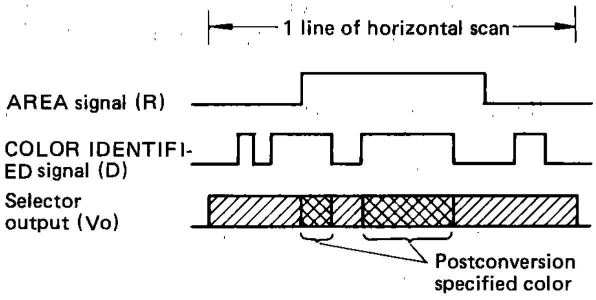

1 line of horizontal scan
AREA signal (R)
COLOR IDENTIFIED signal (D)
Selector output (Vo)
Postconversion specified color

Figure 3-38 Specified color conversion

c. Painting

Painting in a specified area is performed as follows.

For painting, the COLOR IDENTIFIED signal (D) is outputted continuously by the color identification unit, so the postconversion color data are used as the painting color data any time that the AREA signal (R) is being outputted (R = 1).

The signals are shown in Figure 3-39.

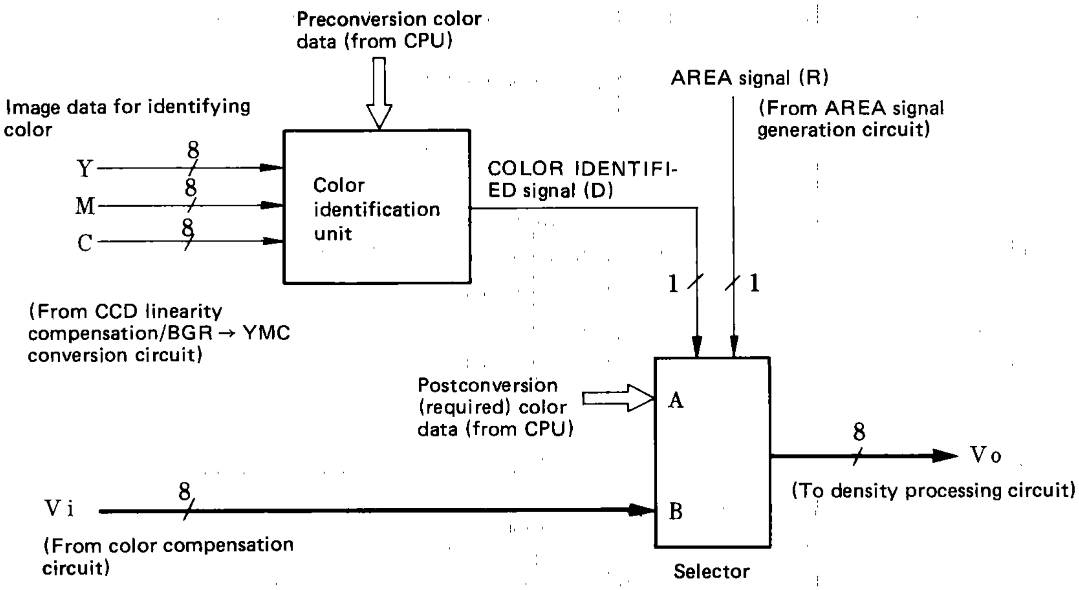

Preconversion color data (from CPU)
Image data for identifying color
Y
M
C
8
8
8
Color identification unit
(From CCD linearity compensation/BGR → YMC conversion circuit)
COLOR IDENTIFIED signal (D)
AREA signal (R)
(From AREA signal generation circuit)
1
1
Postconversion (required) color data (from CPU)
A
B
Selector
8
Vo
(To density processing circuit)
Vi
8
(From color compensation circuit)

Figure 3-37 Color conversion circuit

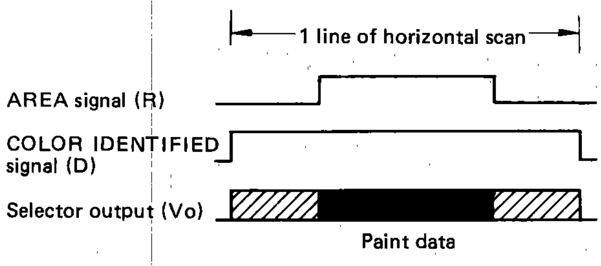

1 line of horizontal scan
AREA signal (R)
COLOR IDENTIFIED signal (D)
Selector output (Vo)
Paint data

Figure 3-39 Painting in specified area

d. Framing/blanking

When framing or blanking are specified, just as for the paint function, the CPU sets the preconversion color data to such a value that the COLOR IDENTIFIED signal D is always 1. It also sets the postconversion color data to white.

The AREA signal R is outputted in the following way.

- For framing, R = 1 only for the region outside the specified area.
- For blanking, R = 1 only inside the specified area.

The selector output is white data only when R = 1, and framing or blanking are to be performed.

Figure 3-40 shows this operation.

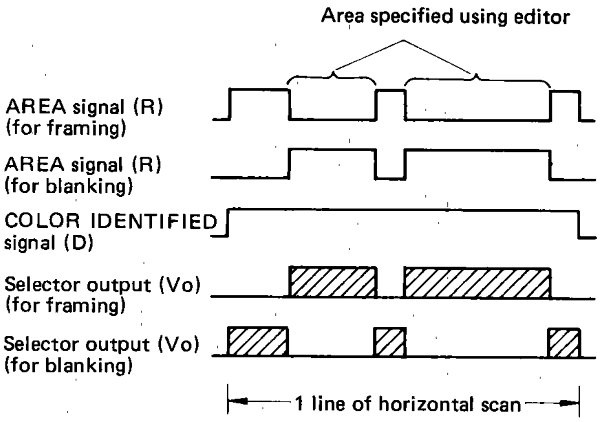

Area specified using editor
AREA signal (R) (for framing)
AREA signal (R) (for blanking)
COLOR IDENTIFIED signal (D)
Selector output (Vo) (for framing)
Selector output (Vo) (for blanking)
1 line of horizontal scan

Figure 3-40 Framing/blanking

8. Density Processing

Figure 3-41 shows a block diagram of the density processing circuit. This circuit consists of a RAM into which eight conversion tables can be written.

The CPU writes the conversion data into the yellow, magenta, cyan, or black conversion table to suit the density adjustment and color balance values set via the control panel. When an area is specified via the control panel, and density or color balance are changed either inside or outside the area, the CPU writes two conversion tables for each of the four colors, for a total of eight tables, into RAM.

Once document scanning begins, a conversion table is selected to suit the area signal outputted by the area generation circuit and the color select signal output by the CPU. The 8-bit image signal is used as a RAM address signal, and the 8-bit conversion data stored at that address is then outputted by the RAM.

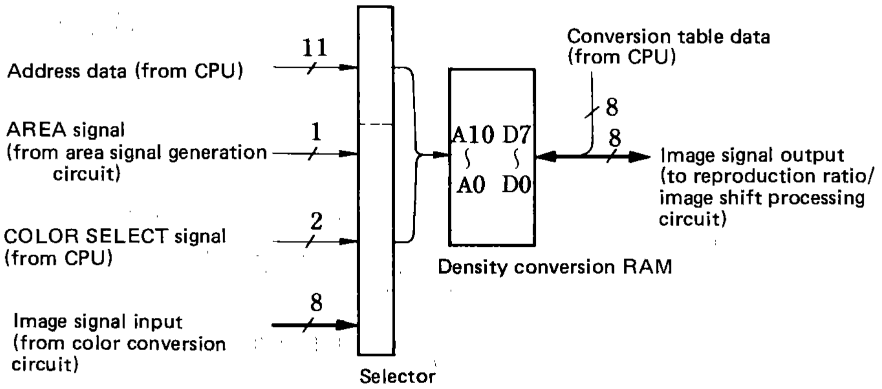

Address data (from CPU)
11
AREA signal (from area signal generation circuit)
1
COLOR SELECT signal (from CPU)
2
Image signal input (from color conversion circuit)
8
Selector
A10 D7
A0 D0
Density conversion RAM
Conversion table data (from CPU)
8
8
Image signal output (to reproduction ratio/ image shift processing circuit)

Figure 3-41 Density processing circuit

9. Reproduction Ratio/Image Shift Processing

a. General

The image signal from the density processing circuit is stored in the line memory line-by-line. When the signal is read out, it is inputted to the sharpness/filter processing circuit.

When writing to or reading from the line memory, the reproduction ratio in the horizontal scan direction can be changed by varying the clock pulse rate for write or read operations.

Image shift processing in the horizontal scan direction is performed by varying the WRITE ENABLE INTERVAL signal (WE) and the READ ENABLE INTERVAL signal (RE).

b. DIRECT copy processing

If the frequency of VCLK and RCLK is identical, each data bit is writen into the line memory. Similarly, if the frequency of VCLK and ECLK is identical, each data bit in line memory is read out. The result is DIRECT (1:1) reproduction ratio.

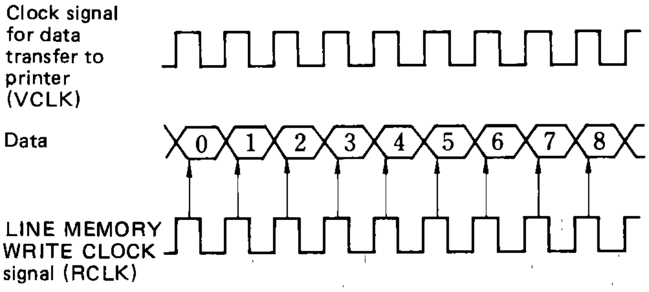

Clock signal for data transfer to printer (VCLK)
Data
0
1
2
3
4
5
6
7
8
LINE MEMORY WRITE CLOCK signal (RCLK)

Figure 3-43

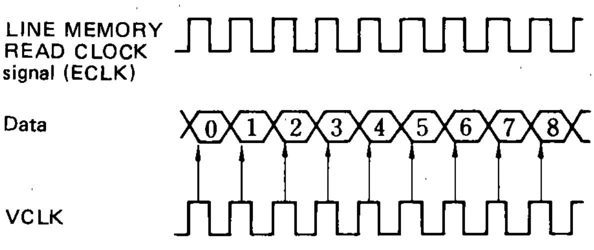

LINE MEMORY READ CLOCK signal (ECLK)
Data
0
1
2
3
4
5
6
7
8
VCLK

Figure 3-44 DIRECT copying

c. REDUCTION processing

The image in the horizontal scan direction is reduced by outputting the LINE MEMORY WRITE CLOCK signal (RCLK) at a lower frequency than VCLK, so some pulses of VCLK are skipped and only some image signals are written into the RAM. For example, for 50% reduction, the frequency of RCLK is twice that of VCLK. As a result only one write operation is performed for every two image signals, reducing the data by half and the resultant printout by 50%.

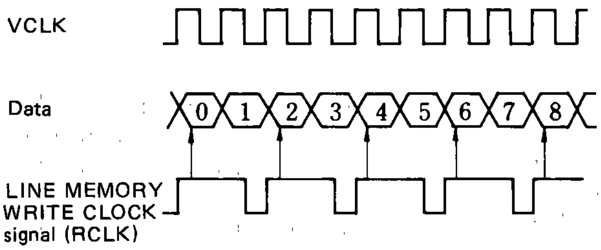

VCLK
Data
0
1
2
3
4
5
6
7
8
LINE MEMORY WRITE CLOCK signal (RCLK)

Figure 3-45 REDUCTION

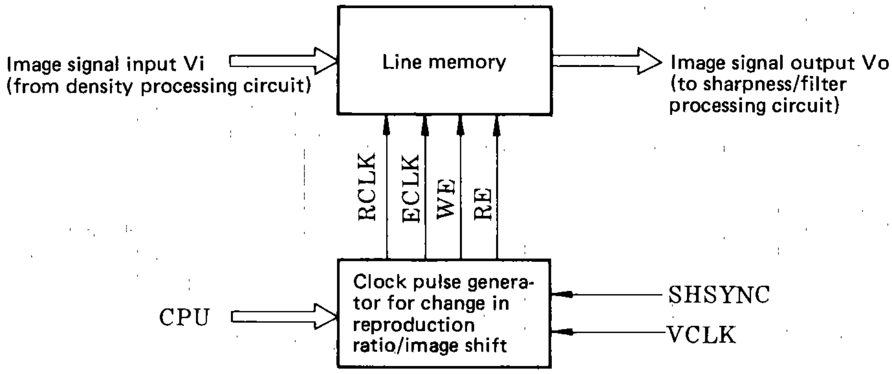


Image signal input Vi (from density processing circuit)
Line memory
Image signal output Vo (to sharpness/filter processing circuit)
RCLK
ECLK
WE
RE
CPU
Clock pulse generator for change in reproduction ratio/image shift
SHSYNC
VCLK

Figure 3-42 Reproduction ratio/image shift circuit

d. ENLARGEMENT

The image in processing the horizontal scan direction is enlarged by outputting the LINE MEMORY READ CLOCK signal (ECLK) at a lower frequency, so more than one pulse of VCLK is outputted, thus partially repeating reading image data out of line memory.

For example, for 200% enlargement, the pulse length of ECLK is made twice that of VCLK so each unit of data is read twice, so each image signal is transferred to the printer twice to produce a printout twice the size of the original.

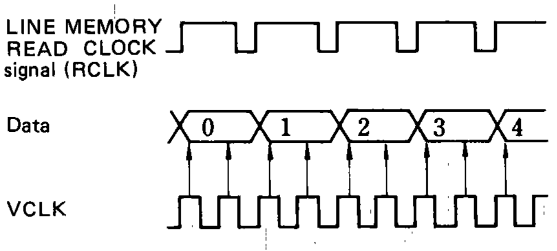
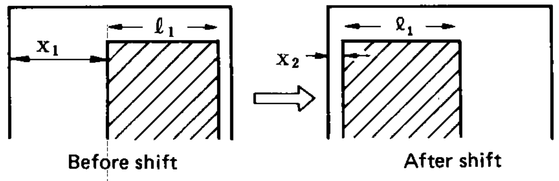

LINE MEMORY
READ CLOCK
signal (RCLK)
Data
0
1
2
3
4
VCLK

Figure 3-46 ENLARGEMENT

e. Image shift processing

Figure 3-47 shows the operation of shifting an image.

To change the reproduction ratio or to shift the image, the clock pulse generator outputs the WRITE ENABLE INTERVAL signal (WE) only at the time that will cause data from the scanner (for the desired area of the document, all other areas deleted) to be read into memory. Thus, in Figure 3-47, only the area ℓ_1 is written into memory ($\overline{WE}$ is active "0" only when scanner is traversing ℓ_1) and data are written into memory only for ℓ_1. The data for ℓ_1 are read out of memory (RE = 0) only at the time that will cause ℓ_1 to be printed at the new (shifted) position, as shown in Figure 3-47 "after shift".



Before shift

After shift

Figure 3-47

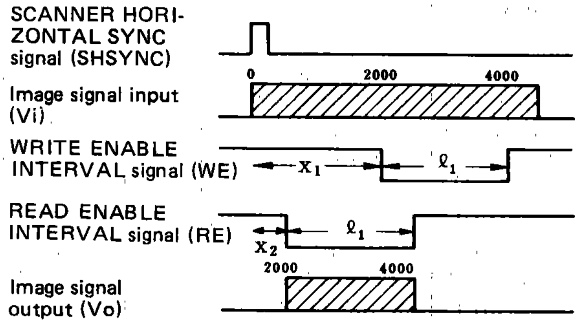

SCANNER HORIZONTAL SYNC signal (SHSYNC)
0
2000
4000
Image signal input (Vi)
WRITE ENABLE INTERVAL signal (WE)
X1
ℓ1
READ ENABLE INTERVAL signal (RE)
X2
ℓ1
2000
4000
Image signal output (Vo)

Figure 3-48 Shift operation

10. Sharpness/Filter Processing

Figure 3-49 shows the sharpness/filter processing circuit. The image signal Vi outputted by the reproduction ratio/image shift processing circuit is temporarily stored in the line memory, then data for several lines are simultaneously inputted to the sharpness circuit and the filter circuit so that the data for scanning lines before and after the line being processed by the sharpness and filter circuits can be used for comparison and their data used for computations.

When the degree of sharpness has been selected via the control panel, the CPU puts suitable coefficients into registers 1 and 2 of the sharpness/filter control circuit.

There is some increase in electrical noise when the edge component of the data outputted by the sharpness circuit is intensified. This noise is eliminated by the noise elimination circuit, then the edge component is increased or decreased by the multiplication circuit according to the sharpness coefficients put into register 1.

There are four filter circuits, selected according to the filter selection set in register 2.

All these sharpness filter components are added together and then output to the printer.

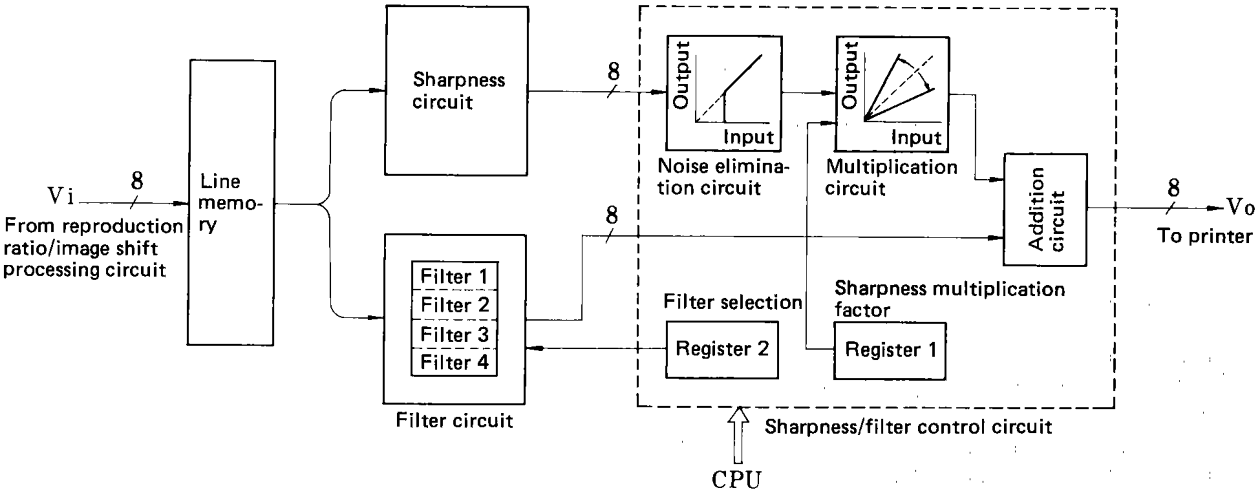

Vi
8
From reproduction ratio/image shift processing circuit
Line memory
Sharpness circuit
Filter 1
Filter 2
Filter 3
Filter 4
Filter circuit
8
8
Output
Input
Noise elimination circuit
Output
Input
Multiplication circuit
Addition circuit
Filter selection
Register 2
Sharpness multiplication factor
Register 1
Sharpness/filter control circuit
CPU
8
Vo
To printer

Figure 3-49 Sharpness/filter processing circuit

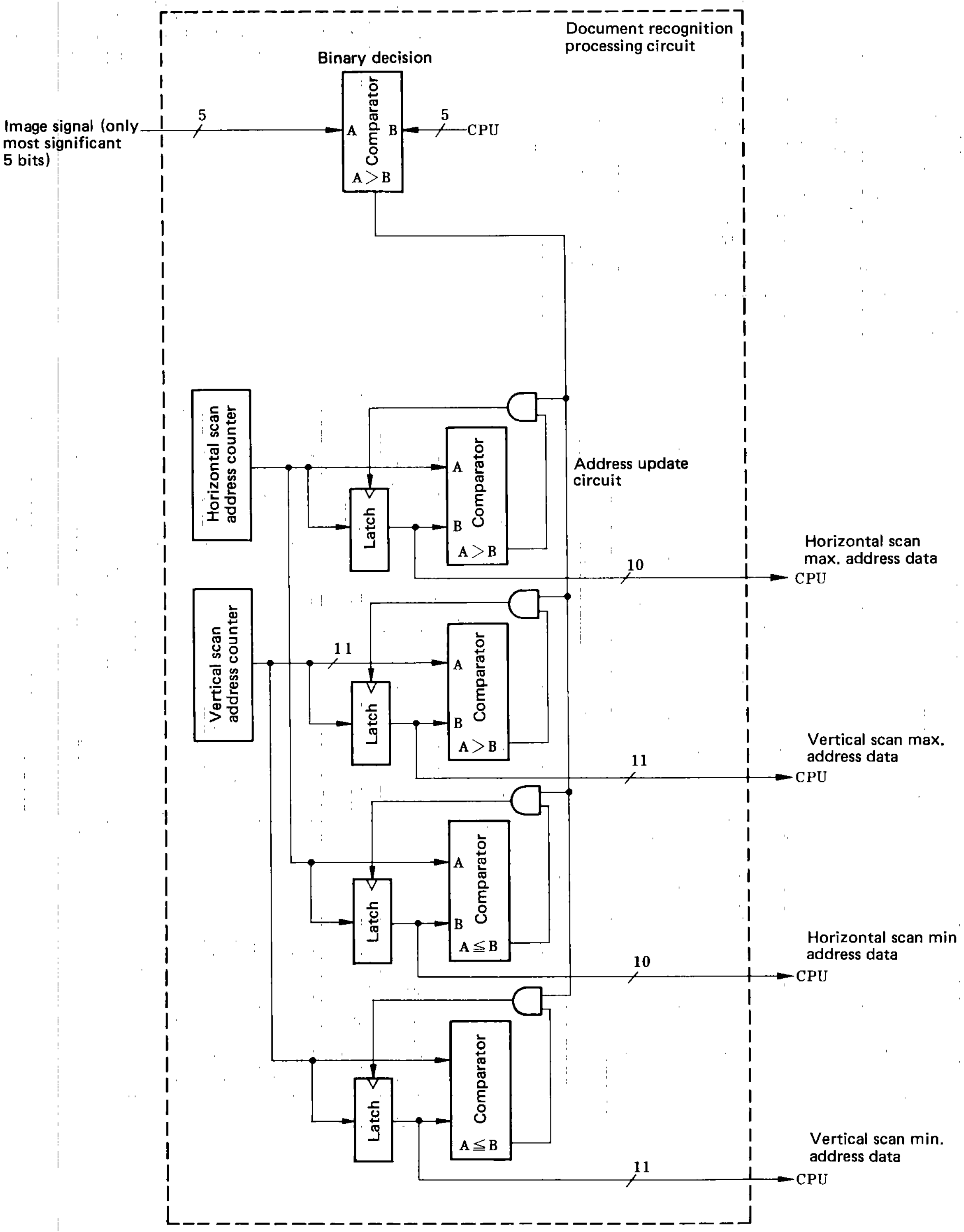
11. Document Position Recognition

Document position recognition is performed with the color compensation circuit set to the single-color mode. Thus, the image signal inputted to this circuit is the average of yellow, magenta, and cyan components.

This image signal is compared by the comparator with the binary data (slice level) outputted by the CPU to determine whether a document is present or not.

These document recognition data are inputted to the address update circuit, and when the presence of a document is detected, they are used to update the horizontal scan address counter and the vertical scan address counter values.

Then the minimum and maximum values of each address counter are stored in the CPU via the latch.



Document recognition processing circuit
Binary decision
Image signal (only most significant 5 bits)
5
A
Comparator
B
A>B
5
CPU
Horizontal scan address counter
Vertical scan address counter
Address update circuit
Latch
Comparator
A
B
A>B
A≦B
10
11
Horizontal scan max. address data
CPU
Vertical scan max. address data
CPU
Horizontal scan min address data
CPU
Vertical scan min. address data
CPU

Figure 3-50

IV. CONTROL PANEL

A. General

The liquid crystal display panel consists of a liquid crystal controller (LCDC), display memory RAM, liquid crystal row driver, and liquid crystal column driver providing up to 128 × 240 dots of display, together with a transparent touch switch panel. Its main features are as follows.

- Liquid crystal display processing
- Touch switch input

B. Operation

a. Liquid crystal display processing

The controller on the operation panel controller circuit passes the commands to the appropriate LCDC in response to its software. The LCDC interprets these commands and executes them. The LCDC performs operations such as switching the display ON/OFF and generating character fonts under control of its software. The LCDC also writes the character codes for display sent from the controller into the sequential display memory RAM.

The data in the display memory RAM are transferred to the column driver via the local bus at a fixed point determined by the timing signal generated by the LCDC.

There are six column drivers. Data are written to the column driver determined by the chip select signal generated by the row driver. After display data have been written to all the column drivers, the LCDC issues a strobe signal (STB) and the column driver outputs one line of display data to the liquid crystal display panel. The LCDC repeats this operation while scanning the row signal to display the characters on the display panel.

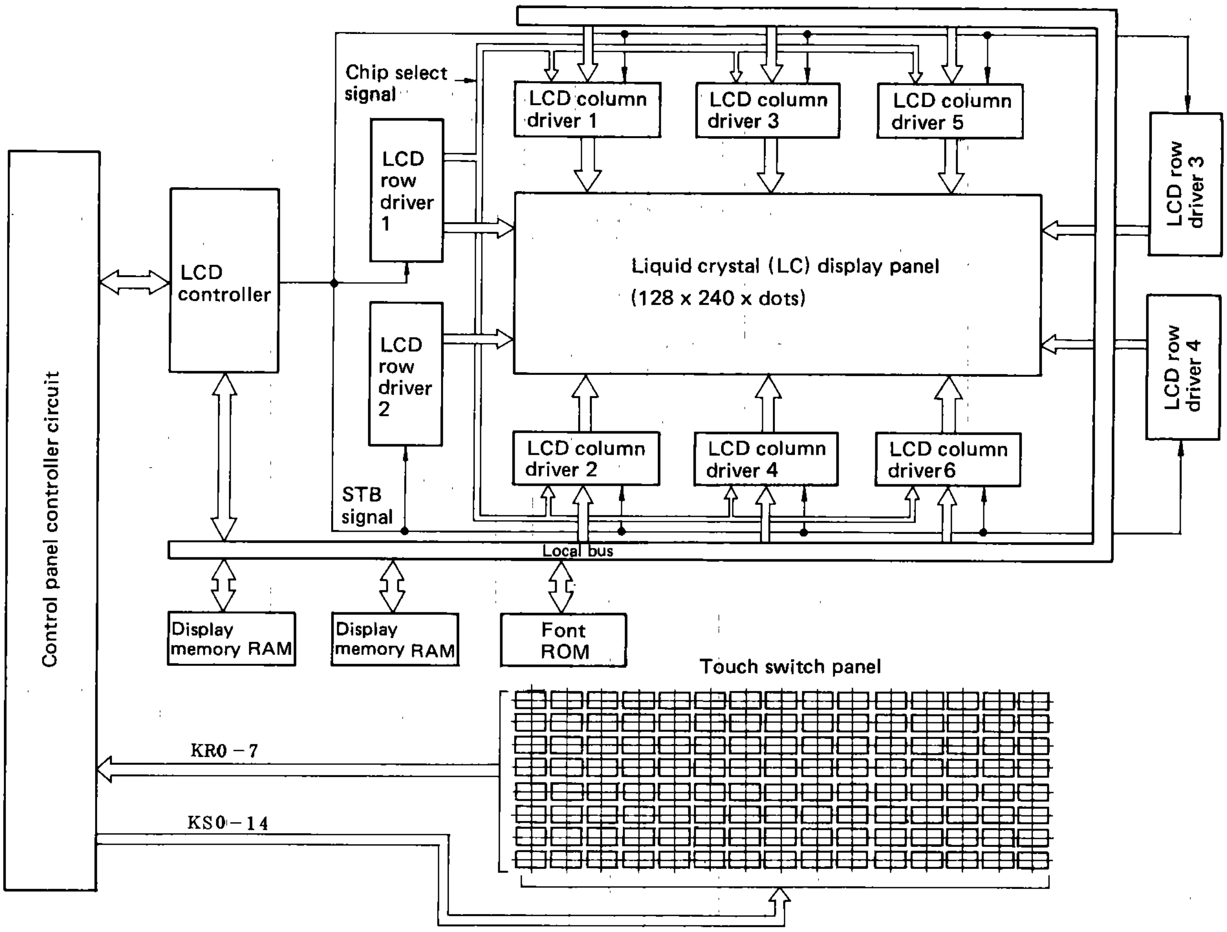

Chip select signal
LCD column driver 1
LCD column driver 3
LCD column driver 5
LCD row driver 1
LCD row driver 2
LCD row driver 3
LCD row driver 4
LCD controller
Liquid crystal (LC) display panel
(128 x 240 x dots)
LCD column driver 2
LCD column driver 4
LCD column driver6
STB signal
Local bus
Control panel controller circuit
Display memory RAM
Display memory RAM
Font ROM
Touch switch panel
KR0 - 7
KS0 - 14

Figure 3-51

b. Touch switch input

The control panel controller PCB and the touch switch panel keys are connected as shown in Figure 3-52. The touch switch panel consists of 8 × 15 keys formed of two sheets of glass covered with a transparent conductive film separated by spacers.

When one of these keys is pressed by the finger or any blunt object, the two sheets of glass contact and a current flows.

This results in a pair of electrodes passing a current which can be used to detect x and y coordinates in the same way as the usual key matrix. That is, the control panel controller can determine which key has been pressed from the correspondence between key scan signals (KS0 to KS14) from the control panel and the signals inputted to the controller circuit (KR0 to KR7).

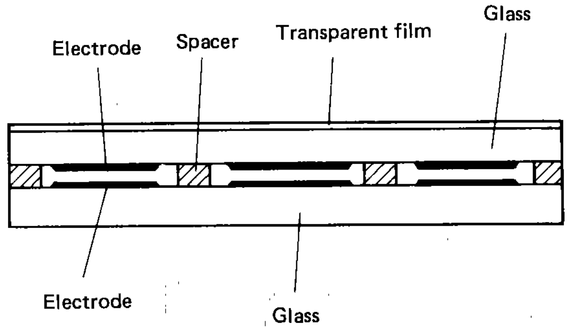


Figure 3-52

c. Liquid crystal contrast adjustment

The liquid crystal display contrast can be changed by adjusting VR1 on the liquid crystal display PCB.

V. EDITOR

A. General

The editor operates by capacitive coupling to determine the position of a stylus that is pressed against positions on a document (placed on a flat tablet) that are to be recorded. There are actually two thin tablets, one a top the other, one to determine x-direction position, and one for the y-direction position.

There is a regular pattern of parallel electrode wires at 6 mm intervals in each tablet, the wires in the two tablets being at right angles to each other.

B. Operation

When the stylus is pressed on the tablet, and voltage pulses are applied to each electrode wire in turn (via the two tablet decoders). The voltage measured by the stylus by the signal is proportional to the distance between the stylus and the wire. By this means the position of the stylus can be identified.

The voltages thus read in are converted into digital signals by the A/D converters in the controller, and then used to identify physical areas (in mm units) on the tablet by arithmetic operations of the CPU. The result is transmitted to the copier to identify areas on its copyboard.

Note:
Because of the principle of operation using an electric field, it can be used even for thick documents (up to 4 mm). However, objects composed of conductive materials, and carbon-backed paper cannot be used.

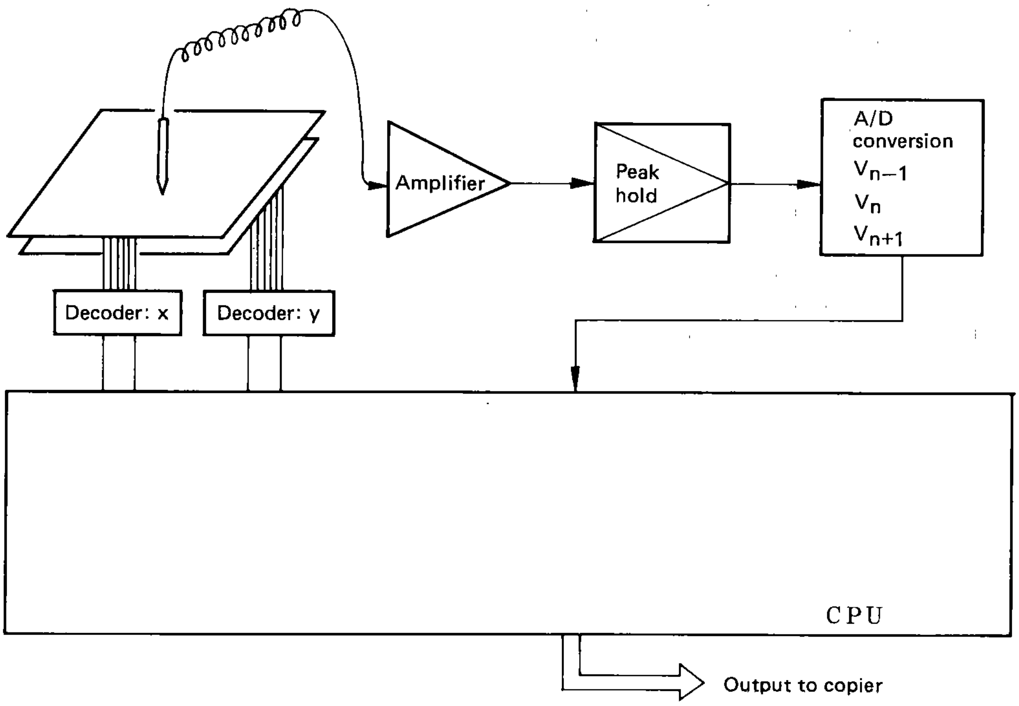


Figure 3-53

Reference: Detection Method

Pulses applied sequentially to electrode lines (1, ---, n–1, n, n+1)

If nth electrode line maximum value is Un then L=1(n-1), where 1 is the pitch between lines

S=Un – Un–1/Un – Un + 1 and x is then calculated using the data tables

Values L + x and L – x are obtained where L + x gives the value between n and n + 1 and L – x gives the value between n and n – 1

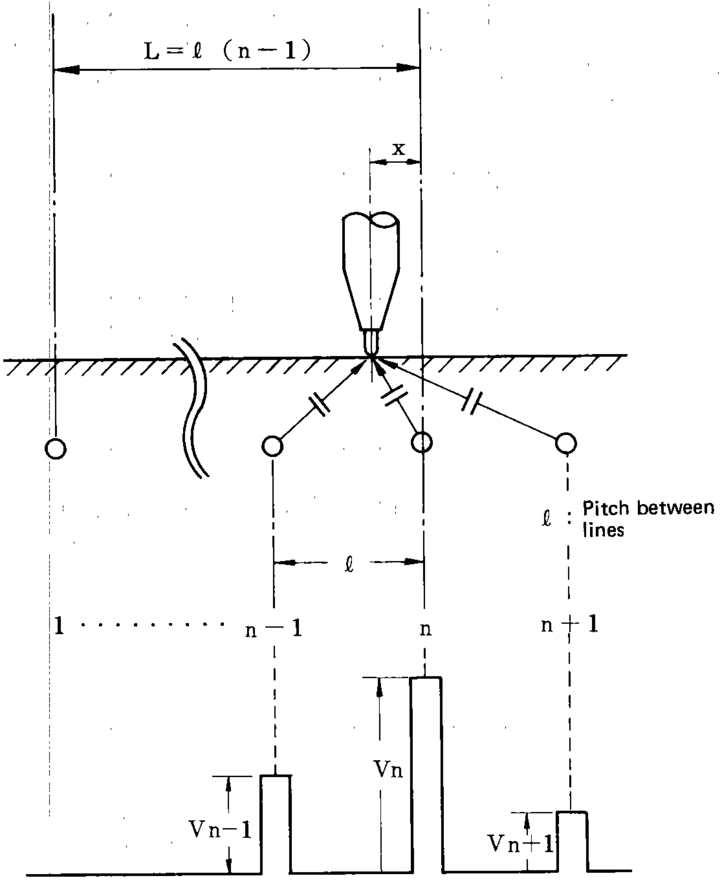


Figure 3-54

C. Zero Adjustment of the Editor Tablet Unit

If the controller PCB or the tablet unit in the editing unit is replaced, set the DIP switches of the controller PCB (Figure 3-57) as shown on the label (Figure 3-56) of the tablet unit (shown in Figure 3-55).

If more zero adjustment is required beyond this , adjust <EDIT ADJ> in the service mode.

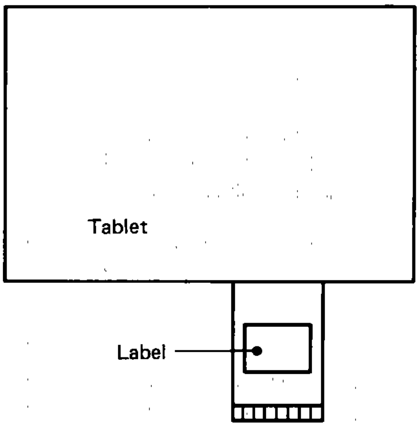

Tablet
Label

Figure 3-55

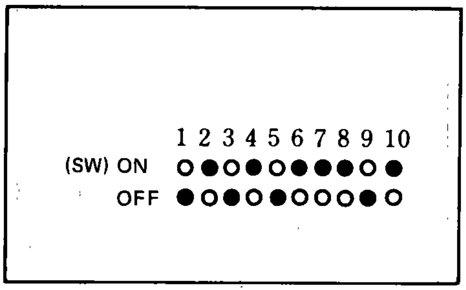

1 2 3 4 5 6 7 8 9 10
(SW) ON ○●○●○●●●○●
OFF ●○●○●○○○●○

Figure 3-56 Example of setting
(●: Toggle position)

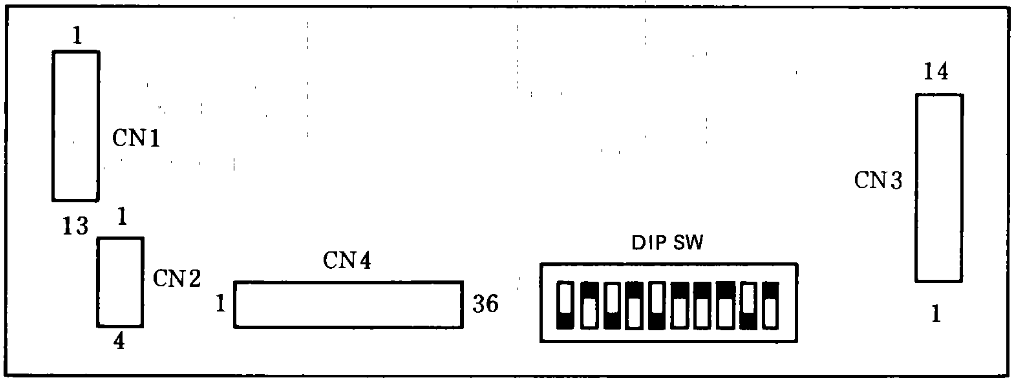

1
CN1
13
1
CN2
4
CN4
1
36
DIP SW
14
CN3
1

Figure 3-57 Controller PCB

VI. POWER SUPPLY

A. Layout

Figure 3-58 shows all the power supplies in the IMAGE SCANNER unit.

When the power switch (SW1) is set ON, AC line voltage is applied to the DC power supply PCB, which supplies the following DC voltages: S24V, P24V, D5V, 12V, +A5V, −A5V to various parts of the machine.

B. Protective Measures

In addition to the main circuit breaker shown in Figure 3-58 (CB1), the DC power supply is protected by an on-board fuse in the AC input line, and by an overcurrent protection circuit which cuts off current in the event of excessive current flow due to a fault.

If the protective circuit operates, set the main power switch OFF, eliminate the cause of the problem (leave the switch OFF for a minimum of 30 seconds), then switch the power back on. This procedure resets the protective circuit.

If the problem is not corrected and the system is repeatedly reset, the fuse will blow.

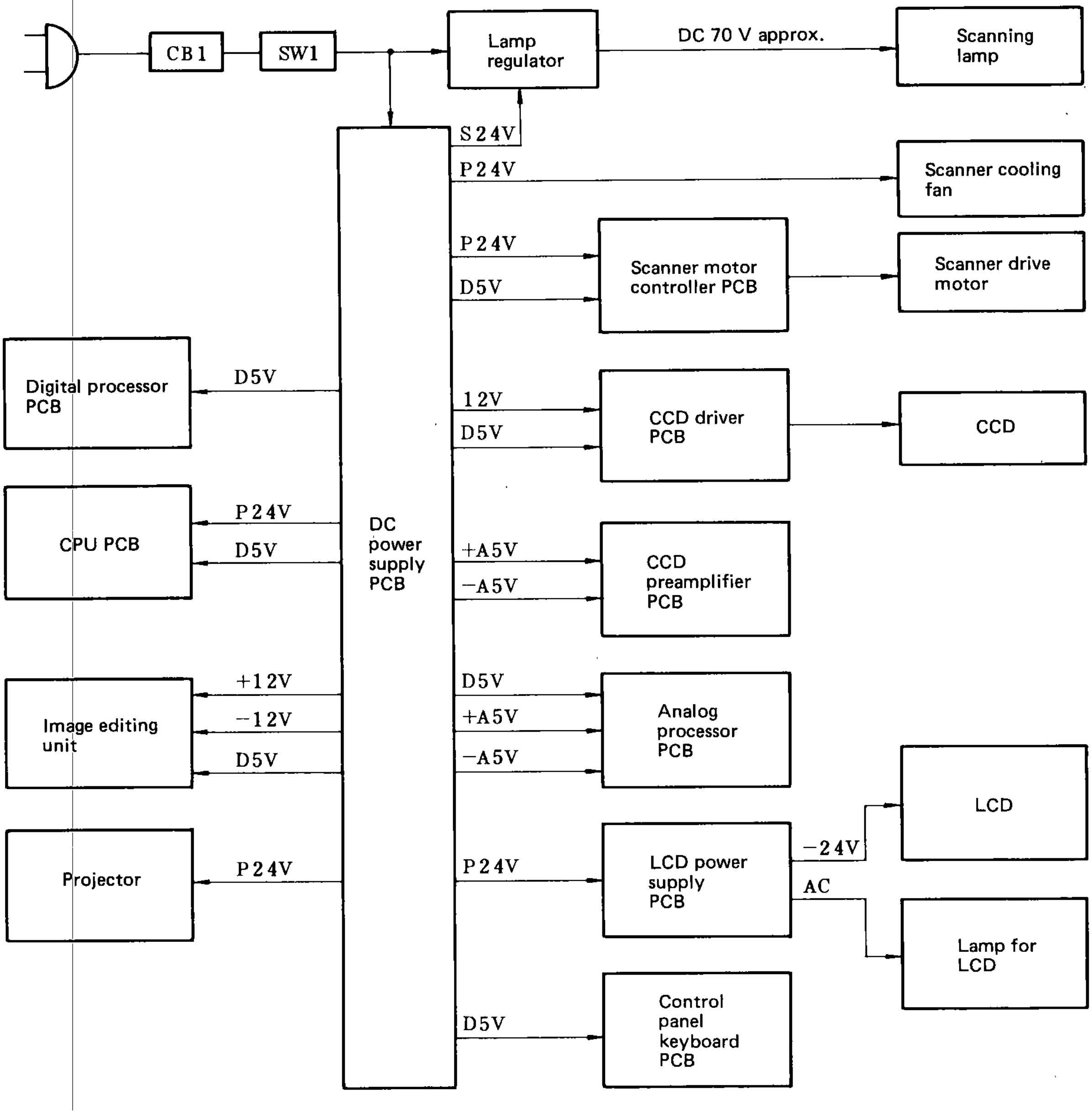
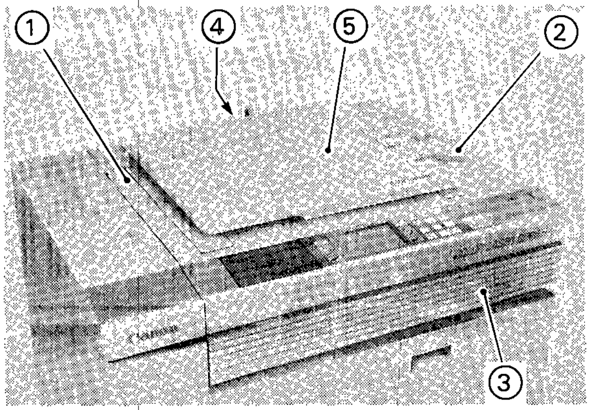

CB1
SW1
Lamp regulator
DC 70 V approx.
Scanning lamp
S24V
P24V
Scanner cooling fan
P24V
D5V
Scanner motor controller PCB
Scanner drive motor
Digital processor PCB
D5V
12V
D5V
CCD driver PCB
CCD
CPU PCB
P24V
D5V
DC power supply PCB
+A5V
−A5V
CCD preamplifier PCB
Image editing unit
+12V
−12V
D5V
D5V
+A5V
−A5V
Analog processor PCB
LCD
Projector
P24V
P24V
LCD power supply PCB
−24V
AC
Lamp for LCD
D5V
Control panel keyboard PCB

Figure 3-58

I. EXTERNALS

A. External Covers/Panels



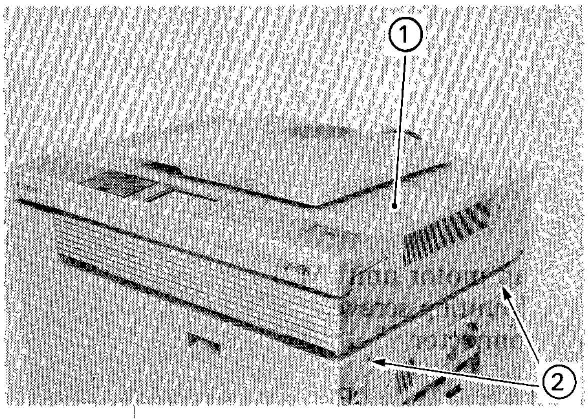
① Left cover (4)
② Right cover (5)
③ Front cover (6)
④ Rear cover (4)
⑤ Editor

Figure 4-1

Note:
Figures in parentheses ( ) indicate the number of screws.

In the following, the procedure for removing covers and panels is omitted if they can be removed by simply removing screws.

1. Removing the copyboard glass
 1) Remove two mounting screws and slide the Image Scanner unit to the right.



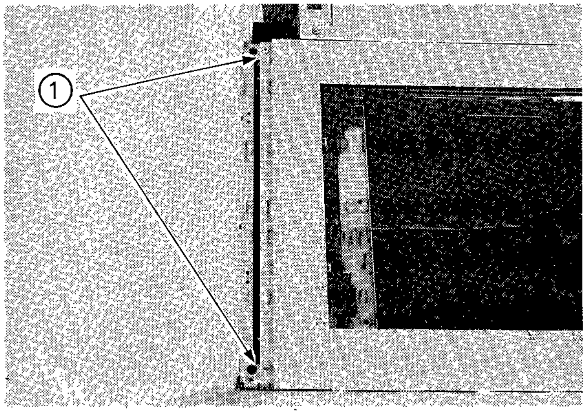
① Image Scanner
② Screws

Figure 4-2

 2) Remove the left cover.

Note:
Be careful not to drop screws onto the PC boards.

 3) Open the editor fully.
 4) Remove two screws and detach the copyboard glass retainer (right).
 5) Scribe along the left edge of the copyboard glass retainer (left) to mark its position.

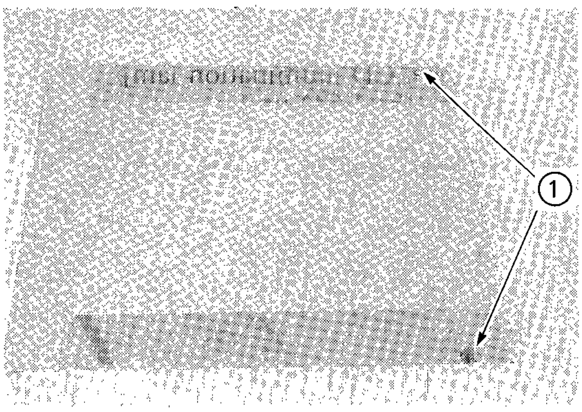


① Scribed line

Figure 4-3

 6) Remove two screws and detach the copyboard glass retainer (left).
 7) Remove the copyboard glass.

2. Installing the copyboard glass
 1) Place the copyboard glass with its edge firmly against the glass retainer at the front of the Image Scanner, making sure that two grounding parts at the right of the copyboard glass are in contact with the frames.



① Grounding plate

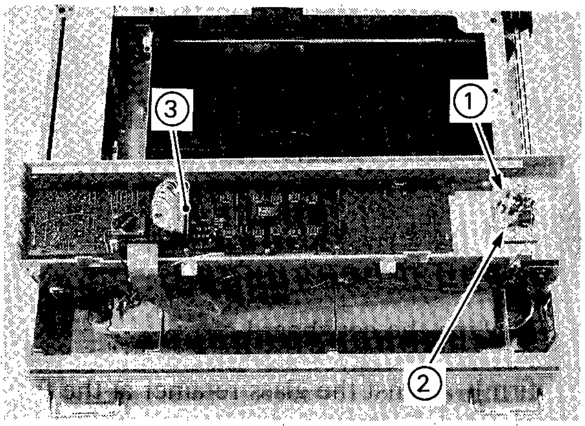
Figure 4-4

 2) Install the copyboard glass retainer (left) along the scribed line.
 3) Press the copyboard glass leftward (toward the copyboard glass retainer (left).
 4) Install the copyboard glass retainer (right) and the left cover. Replace the two screws shown in Figure 4-2.

B. Control Panel Unit

1. Removing the control panel unit
   1) Remove the copyboard glass.
   2) Remove the right cover.
   3) Remove six mounting screws and detach the front cover.
   4) Remove two mounting screws, two grounding wires, and three cables, and detach the control panel unit.

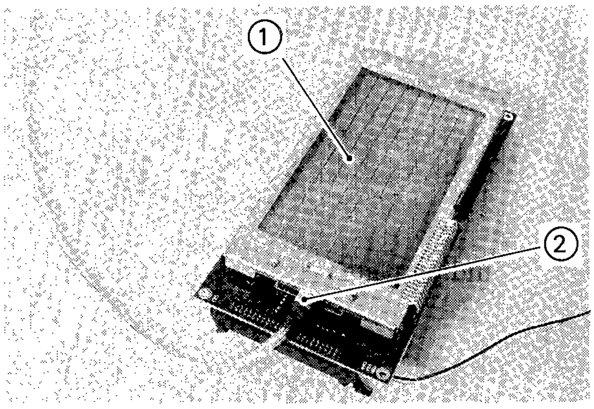
2. Removing the LCD (Liquid Crystal Display) unit
   1) Remove the control panel unit.
   2) Remove six mounting screws, connectors OUT 1 and 3 of the control panel power supply PCB, and three cables, and detach the LCD unit.



① OUT3
② OUT1
③ Cables

Figure 4-5

3. Replacing LCD illumination lamp
   1) Remove the LCD unit.
   2) Pull out the lamp.

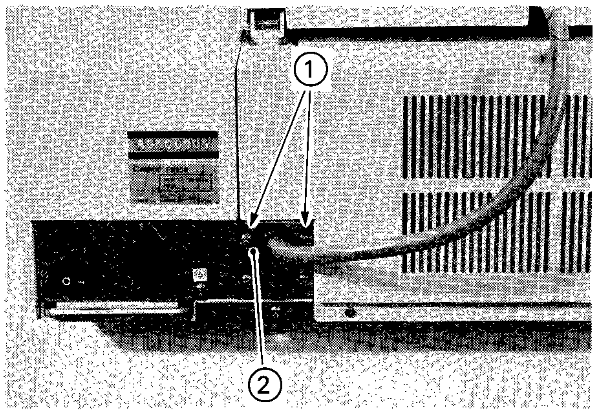


① LCD unit
② Lamp

Figure 4-6

C. Removing the Editor

1) Remove two mounting screws and detach the editor cable support plate.



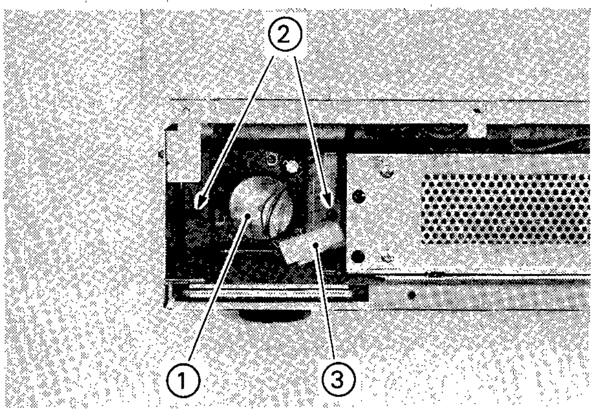
① Mounting screws
② Support plate

Figure 4-7

2) Remove two connectors and detach the editor.

D. Fans

1) Remove the front cover.
2) Remove two mounting screws and one connector, and pull the fan off.



① Fan motor unit (M2)
② Mounting screws
③ Connector

Figure 4-8

II. DRIVE SYSTEM

A. Scanner Drive Assembly

1. Installing the DS unit drive cables

The following describes installing the front (rear) DS unit drive cable. The rear cable is installed in the same way, but as a mirror image.

1) Loosen the setscrews securing both capstans to the shaft.
2) Remove the front mounting plate for the right cover.
3) Attach the cable mounting plate to the cover mounting plate using one screw, as shown in Figure 4-9a.

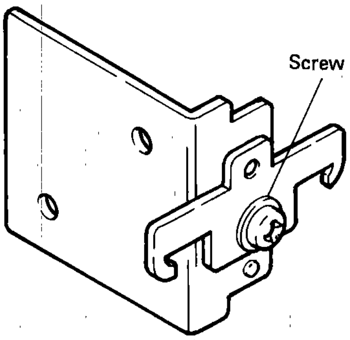


Figure 4-9a

4) Put a cable in the groove of the front capstan with the bead in the recess and the short end of the cable toward the side marked "A" in Figure 4-9.
5) Push the front capstan outward, then tighten the setscrews of the capstan.
6) Wind the shorter end of the cable 5.5 turns CW around the capstan toward the inside of the Image Scanner, pass the end of the cable through the hole in the right plate, and hook the ring on one hook of the cable mounting plate (shown in Figure 4-9a).

Notes:

1. The cover mounting plate prevents the cable mounting plate from being pulled back through the hole in the plate.
2. Put the ring on the hook as shown in Figure 4-9b.

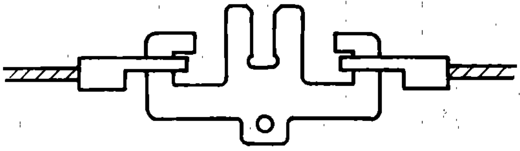


Figure 4-9b

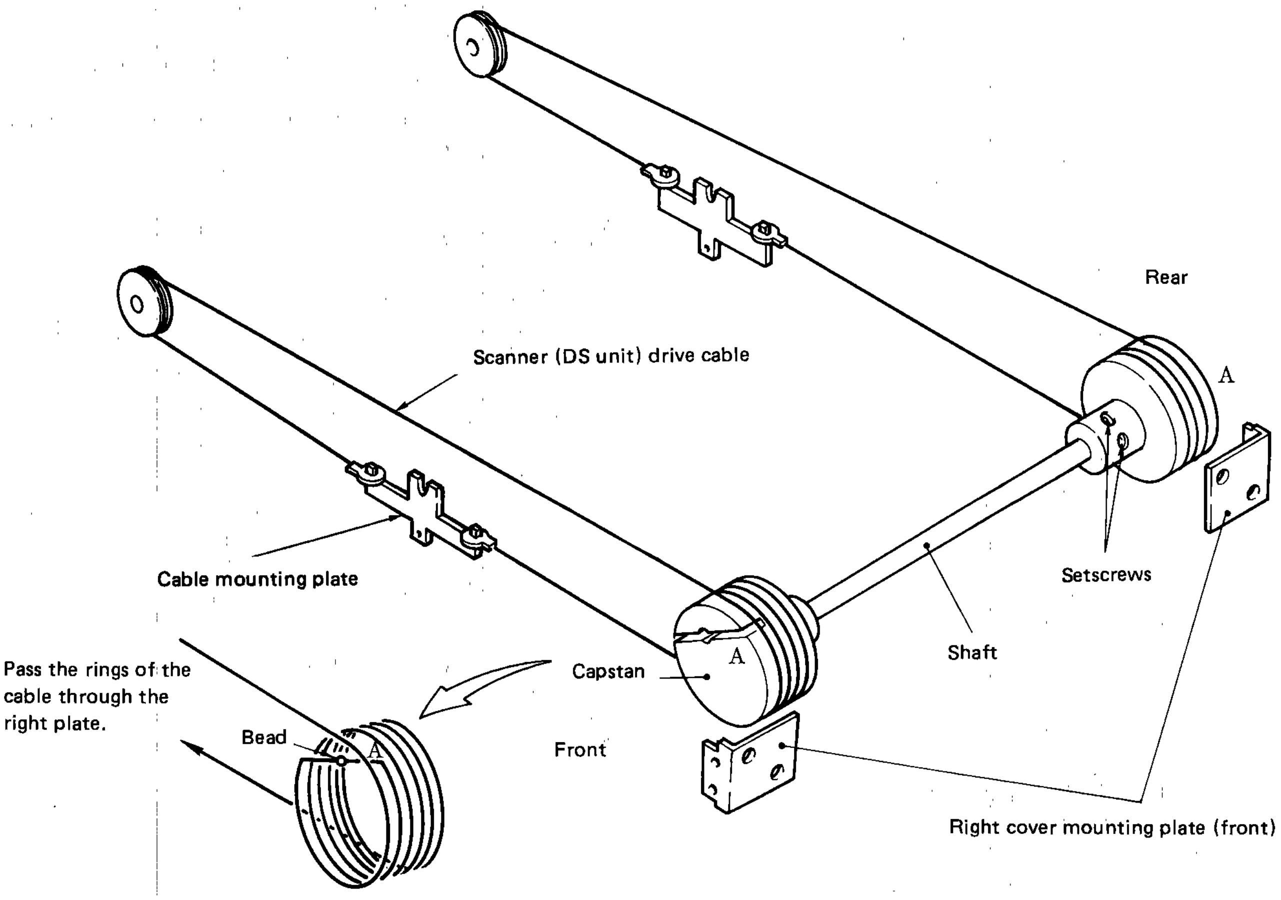

Rear
Scanner (DS unit) drive cable
A
Setscrews
Cable mounting plate
Shaft
Pass the rings of the cable through the right plate.
Capstan
A
Bead
A
Front
Right cover mounting plate (front)

Figure 4-9

7) Wind the longer end of the cable 1 turn CCW away from the inside of the Image Scanner, pass it around the idler pulley, and hook the ring on the other hook of the cable mounting plate.
8) Move the cable mounting plate back and forth to confirm that the capstan and pulley turn smoothly.
9) Remove the cover mounting plate from the cable mounting plate.
10) Repeat the procedure for the cable on the rear side, starting at Step 3, winding the cable as a mirror image of the front cable.
11) Attach the cable mounting plates to the two ends of the DS unit.
12) Follow the procedure of "Adjusting squareness".

2. Adjusting squareness
1) Move the DS unit fully to the left. Install the copyboard glass with its front edge firmly to the front.
2) Loosen the two setscrews fastening the rear capstan to the shaft.
3) By turning the rear capstan, move the rear end of the DS unit so that the outer edge of the fiber optic lens array is parallel to the end of the copyboard glass. (Look straight down and align it by eye.)
4) Tighten the setscrews of the capstan carefully so that the lens array stays in alignment.

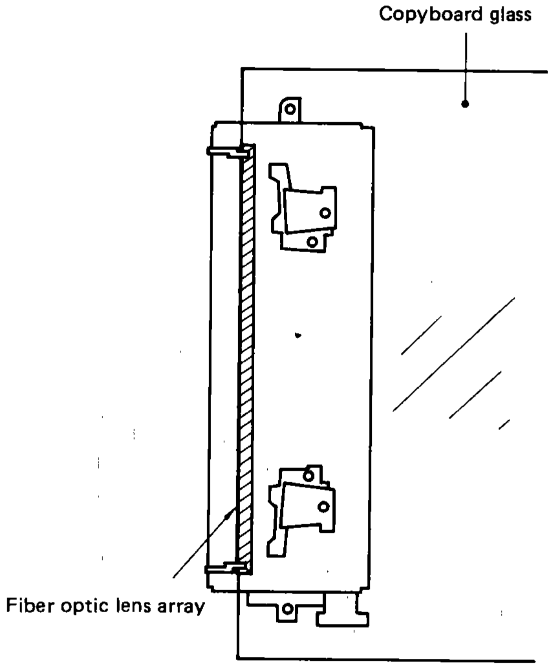


Figure 4-10

5) Make one black, magenta or cyan single-color copy of a test chart.
6) Put the copy over the test chart so that point A and the vertical line shown in Figure 4-11 are aligned.
7) Check that the test chart and the copy match within 1 mm at point B.

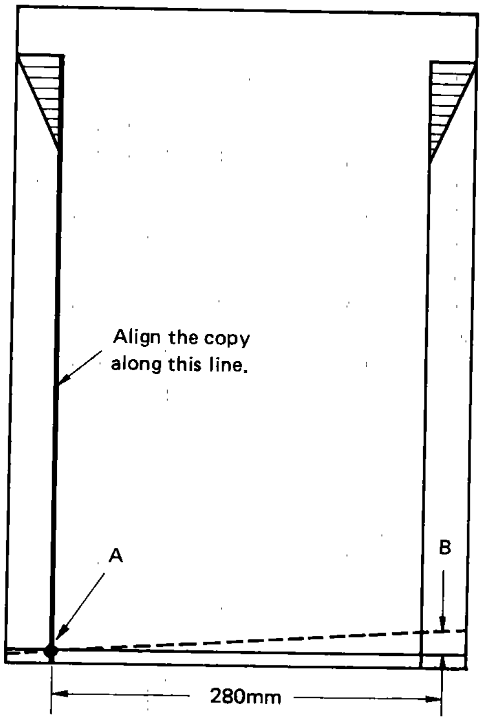
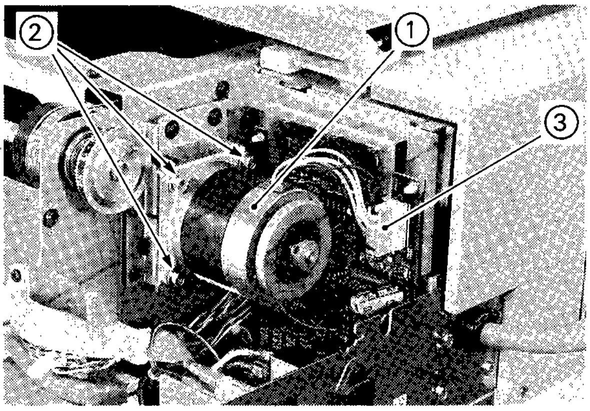


Figure 4-11

- If the error is 1 mm or more, loosen the setscrews and repeat the adjustment.

8) Install the copyboard glass retainer and covers.

3. Removing the scanner motor (M1)
1) Remove the right cover.
2) Disconnect J603 of the scanner motor controller PCB.
3) Remove four screws and detach the scanner motor.



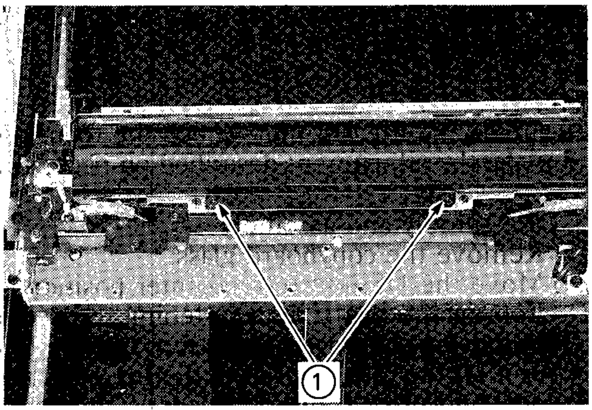
① Scanner motor (M1)
② Screws
③ J603

Figure 4-12

III. EXPOSURE SYSTEM

A. Scanning Lamp Unit

1. Removing the scanning lamp and thermal fuse
   1) Unplug the power cord.
   2) Remove the copyboard glass.
   3) Remove two screws and detach the light blocking plate.



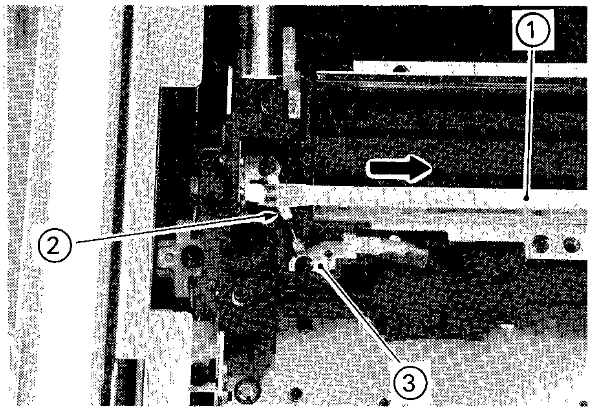
① Screws

Figure 4-13

   4) Remove the scanning lamp by pressing it gently toward the rear of the machine.

Note:
See notes below regarding handling the lamp.

   5) Remove two mounting screws with two washers and detach the thermal fuse.

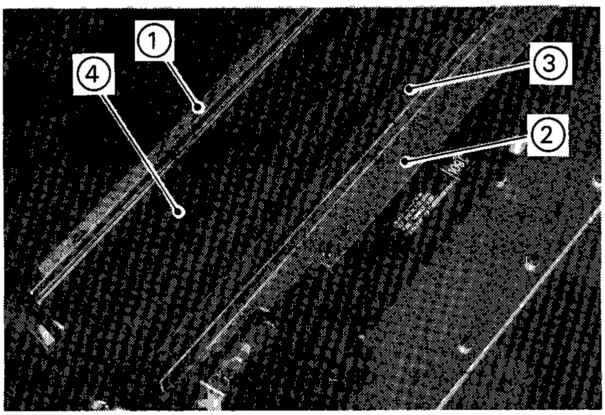


① Scanning lamp
② Thermal fuse
③ Fuse terminal plate

Figure 4-14

Notes:
1. Do not do this while the scanning lamp is still hot.
2. Do not touch the scanning lamp with bare hands.
3. If skin oil or other material is on lamp, clean it thoroughly with a dry cloth. Use a solvent if necessary to remove all oils.
4. Do not overtighten the mounting screws for the thermal fuse.
5. Install the thermal fuse with two washers so that its pointed end contacts the fuse terminal plate.

2. Cleaning the reflector and the fiber optic lens array.

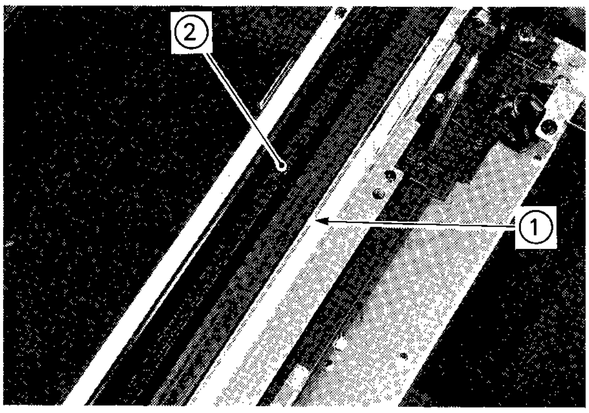


① Left reflector
② Upper reflector
③ Lower reflector
④ Fiber optic lens array

Figure 4-15

   1) Remove the scanning lamp. See above notes.
   2) Clean all reflectors and the lens array with a blower brush.

3. Installing the scanning lamp
   Install the scanning lamp so that the projection on its surface faces the lens array.

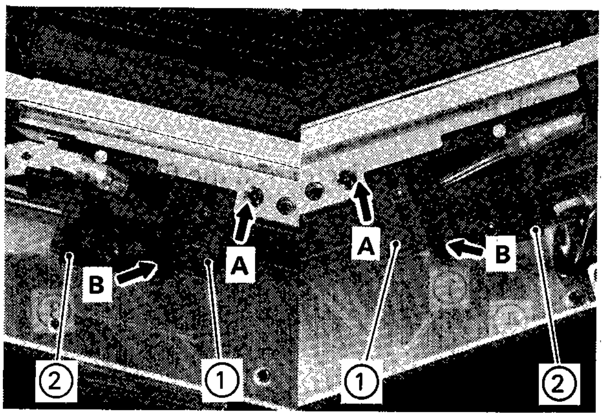


① Projection
② Fiber optic lens array

Figure 4-16

Note:
When the scanning lamp has been replaced, do the adjustment described on page 7-3.

4. Positioning of the side reflector



① Lower adjustment plate
② Upper adjustment plate

Figure 4-17

If, after the scanning lamp has been replaced, the density along either edge of a copy is different from that of the central areas of a copy, first clean all optical surfaces. If this does not solve the problem, reposition the lower adjustment plate of the side reflector.

If the density of a copy of a test sheet of constant density varies in the way shown in Figure 4-18, move the lower adjustment plate in the direction shown by arrow A in Figure 4-17.

If the density of a copy varies in the way shown in Figure 4-19 after the above adjustment, move the upper adjustment plate in the direction shown by arrow B in Figure 4-17 to even the light distribution.

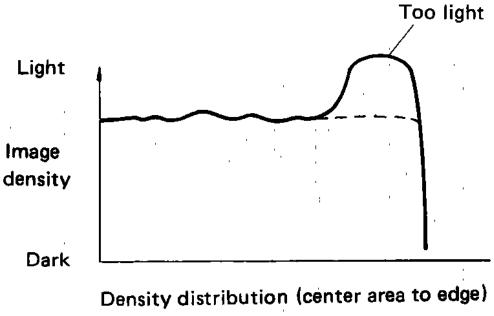


Figure 4-18

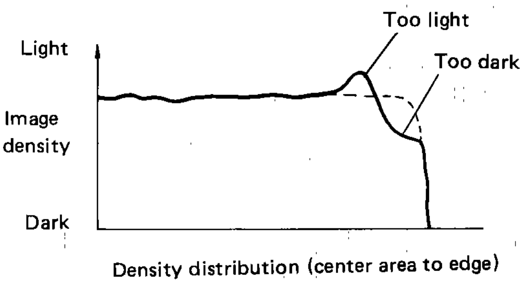


Figure 4-19

B. DS Unit (Document Scanner Unit)

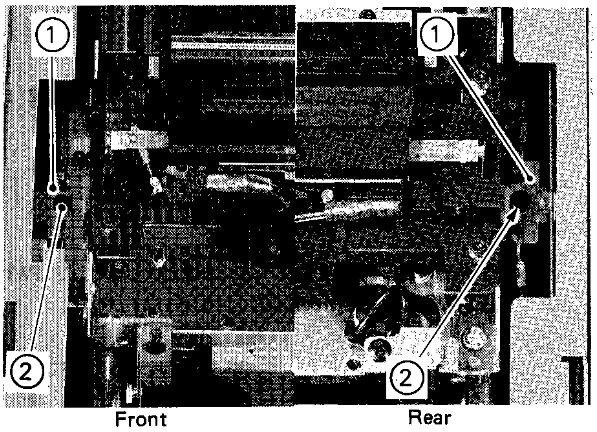
1. General

The DS unit consists of the CCD units, CCD driver PCB, CCD preamplifier PCB, scanning lamp, and fiber optic lens array. The CCD unit produces a signal representing the linear pattern of light and dark areas in the light reflected from a document.

The lens, CCD units, and CCD driver PCB require precise adjustment that is possible only at the factory. If any part becomes faulty, replace the entire DS unit.

Note:
After replacing the DS unit, check the focusing and make the adjustment described on page 7-3.

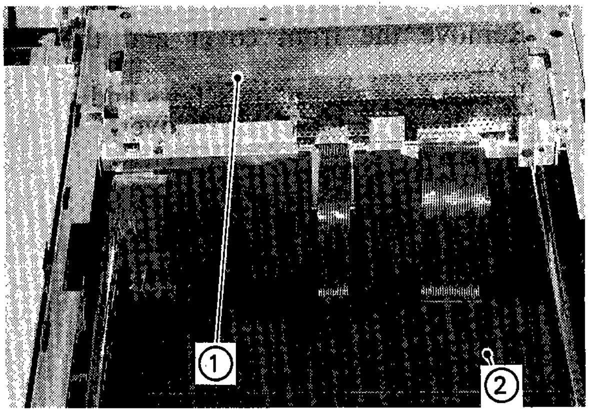
2. Disassembly and assembly
1) Remove the copyboard glass.
2) Move the DS unit to the center position.
3) Loosen the two screws fastening the cable mounting plates to the DS unit. Lift the DS unit off the rails and out of the Image Scanner, and place it upside down as shown in Figure 4-21.



① Cable mounting plate
② Screw

Figure 4-20

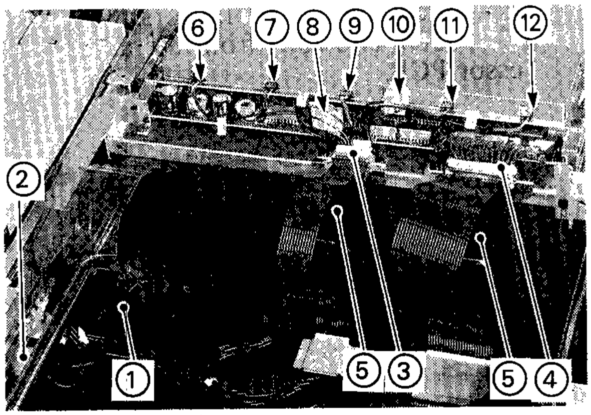
4) Remove four screws and detach the cover of the DS unit.
5) Remove five screws and remove the black cover.



① DS unit cover
② Black cover

Figure 4-21

6) Remove one screw and detach cable clamp A.
   Disconnect the connector to separate the cable from the Image Scanner.
7) Remove four screws and detach cable clamps B, C and two leaf springs.
8) Disconnect the eight connectors (J106 to J111 and J202), then remove the DS unit.



① Cable clamp A
② Connector
③ Cable clamp B
④ Cable clamp C
⑤ Leaf spring
⑥ J106
⑦ J107
⑧ J202
⑨ J108
⑩ J111
⑪ J109
⑫ J111

Figure 4-22

Note:
After installing the DS unit, move the unit carefully by hand to make sure that no cables are caught.

3. Focusing adjustment for DS unit

As shown by the Figure 4-23, focusing adjustment is done with a thumbscrew. Turning the thumbscrew changes the height of the plate A together with the lens array.

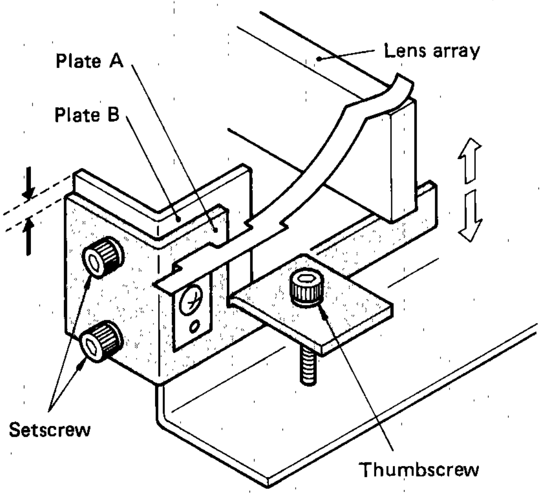


Figure 4-23

Note:
Make preparation for the adjustment as follows:
a) By making half-tone test prints with the printer, confirm that there is no unevenness in density.
b) Confirm that the copyboard cover positively contacts the original.
c) Confirm that the original positively contacts the copyboard glass.
d) Confirm that there is no dirt or foreign matter on the copyboard glass surface.
e) Confirm that there is no dirt or foreign matter on the lens array top surface.
f) Confirm that the position of the copyboard glass is correctly.
g) Confirm that there is no foreign matter on the DS unit raril and DS unit slider.

Procedure:
1) Place NA-2 test sheet on the copyboard glass.
2) Select one of the uniform tone mono-colors for making prints. For ease in adjustment, choose magenta, cyan, or black mono-color.
3) Make one print.
4) Raise the copyboard cover and make one print while applying a moderately strong pressure from above the test chart with your hand.

Note:
At this time, there is a slight sag of the copyboard glass and the distance between the test chart and the lens decreases.

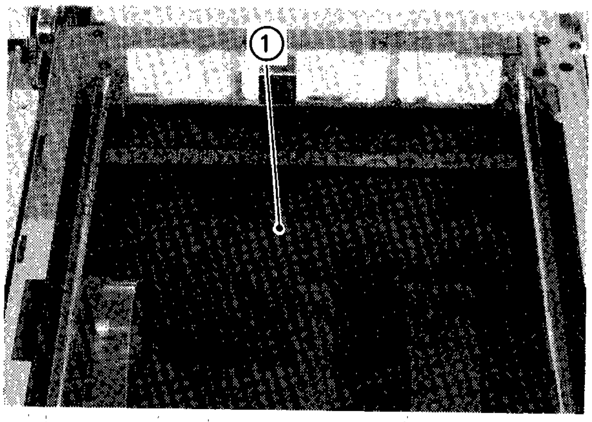
5) Turn OFF the power and remove the left cover, both left and right copyboard glass retainers, and the copyboard glass.

6) Before going onto step 7), measure the difference in height between plates A and B shown in the Figure 4-23.
7) Remove one of the four setscrews with its washer and remove the adhesives from the setscrew and its washer. Put back the setscrew and washer but do not yet fully tighten them. Go through the process separately (no particular order) for the remaining three setscrews and washers.
8) Push down plate A and confirm that the lens array can move up and down.
9) If the image of the print made in Step 4 suffers more from the lack of sharpness compared to the print made in Step 3, turn the thumbscrew clockwise about a half turn. As the result, height of the lens decreases.
If the image of the print made in Step 4, on the contrary, suffers less from the lack of sharpness compared to the print made in Step 3, turn the thumbscrew counterclockwise about a half turn. As the result, height of the lens increases.
10) Fully tighten the setscrews and reinstall the copyboard glass and the copyboard glass retainers.
11) Turn ON the power and repeat steps 1 to 10 until the prints produce sharp image.

IV. PRINTED CIRCUIT BOARDS

A. Removing PC Boards

1. Removing the CPU, analog processor, and digital processor PC boards
 1) Remove the front cover and the right cover.
 2) Remove six mounting screws and remove the black PC board upper cover.

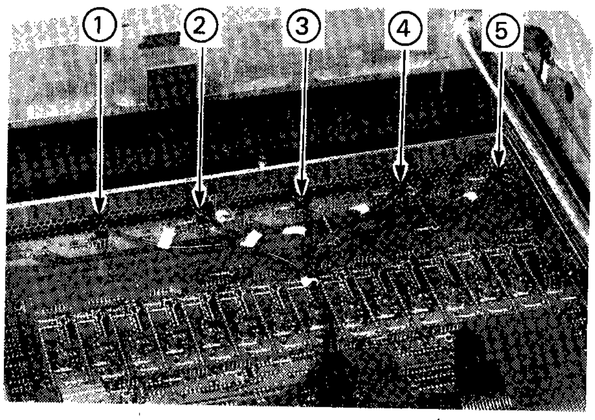


① Black PC board upper cover

Figure 4-24

Note:
Be careful not to catch five wires on the projection on the cover.

 3) Disconnect the five connectors J303, J304, J305, J306, and J307 from the analog processor PCB.



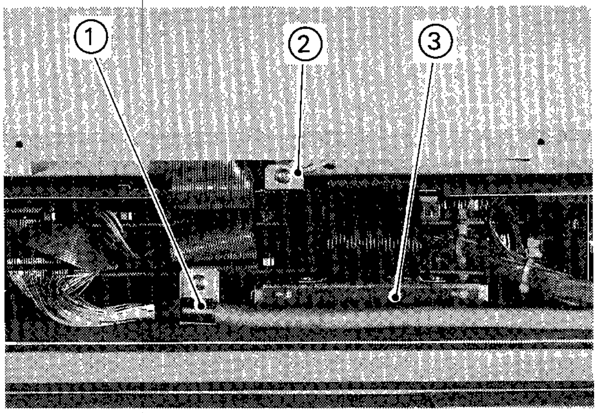
① J303
② J304
③ J305
④ J306
⑤ J307

Figure 4-25

4) Remove eight mounting screws and detach the PC board compartment front cover.

Note:
When installing the PC board compartment front cover, push the PC board compartment downward, then attach the screws.

5) Remove four screws fastening the cable clamp A, the cable clamp B and the grounding wire.
6) Pull the PC board compartment out of the Image Scanner.



① Cable clamp A
② Cable clamp B
(3) Grounding wire

Figure 4-26

7) Remove six mounting screws and detach the PC board compartment upper cover.
8) Remove the CPU, analog processor, and digital processor PCB.

Note:
After replacing any of these PC boards, make the adjustment described on page 7-3.

I. INSTALLATION SUGGESTIONS

It is suggested that a serviceman personally visit the customer's premises before installing a Image Scanner unit. The location should meet the following requirements.

- The operating temperature should be in the range 15 to 30°C and relative humidity in the range 10 to 80%. (See figure 5-1 in the Printer Service Manual for details.) Installation near water faucets, humidifiers, air conditioning outlets, and refrigerators should be avoided.
- The Image Scanner unit should not be exposed to open flames, dust, ammonia fumes, or direct sunlight. A heavy curtain can be put up to protect the copier if it must be installed in a location receiving direct sunlight.
- The room should be well ventilated.
- The Image Scanner unit should be installed level on a sturdy support, such as a pedestal or desk, with all feet in firm contact.
- The Image Scanner unit should be located at least 100 mm (4″) from the wall behind it, and there should be sufficient space to permit unimpeded operation.

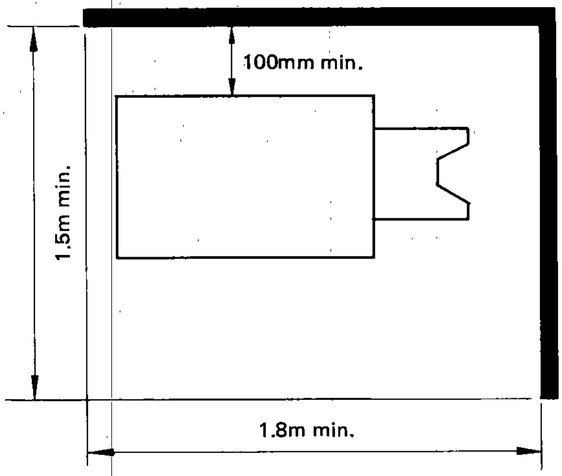
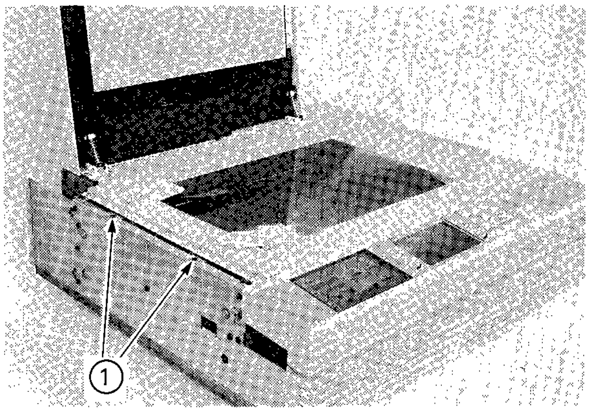


Figure 5-1

II. UNPACKING AND INSTALLATION

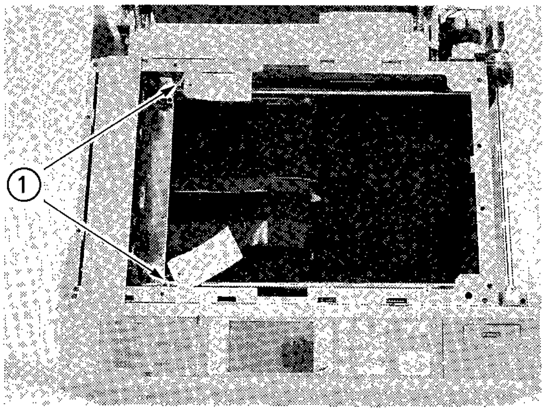
1. Bringing a machine from storage in a cold area into a warm room can cause condensation on the metal and glass parts that will adversely affect printer performance. In such conditions, move the packing crate into the warm room and leave it unopened for at least one hour to allow the machine to warm up.
2. First unpack the printer unit, then unpack the Image Scanner unit. (See Printer Service Manual Chapter 5 for details on printer installation.)

No.	Procedure	Check	Remarks
1.	Unpack the Image Scanner unit and remove all tape from the exterior.		
2.	Place the Image Scanner unit on top of the printer.	Check that the components and accessories listed below are present. · Advice book · Image Scanner unit connector cable · Power cord	
3.	Move the scanner to the right and remove the left cover of the scanner.		
4.	Scribe along the left edge of the standard white plate and remove the standard white plate.		
5.	Remove the copyboard glass, and remove the locking plates and cushioning pad at holding the Document Scanner (DS) unit.		See Figure 5-2. Re-attach the plates (their "lips" facing the other way) at the same locations for future use in transportation.
6.	Remove two cable ties securing the DS unit and attach the copyboard glass, the white standard plate and the left cover.	Tear off the protective plastic film from the index plates.	See Figure 5-3.
7.	Attach the Image Scanner connector cable.		
8.	Plug the scanner power cord into the outlet in the printer. **Note:** Ensure that the power switch is OFF.		
9.	Beyond this point, follow the printer installation procedure. (See Printer Manual Chapter 5.)		



① Locking plates

Figure 5-2

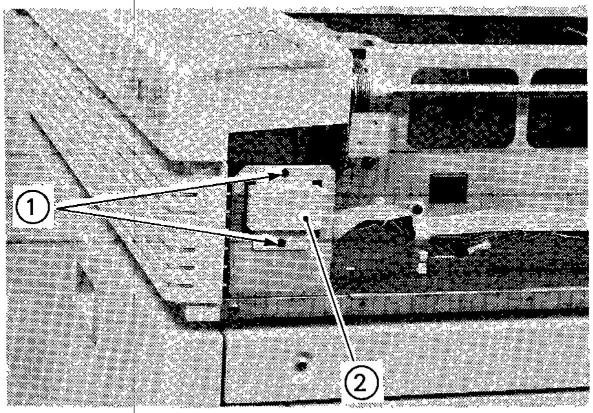


① Cable ties

Figure 5-3

III. ATTACHING CONTROL COUNTER II AND CONTROL CARD III UNIT SOCKET

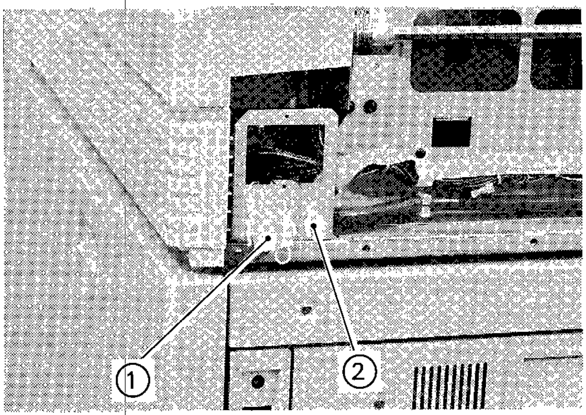
1) Remove the right cover.
2) Remove the two mounting screws, and take off the cover plate.



① Screws
② Cover plate

Figure 5-4

3) Remove the jumper connector shown in Figure 5-5. (It may be discarded.)



① Jumper connector
② 1-pin connector

Figure 5-5

4) Connect two connectors of the leads of the socket for the control counter/control card unit to the four-pin and one-pin connectors shown in Figure 5-5.
5) Attach the socket using the two countersunk screws.

Note:
The arrow on the panel should point upward.

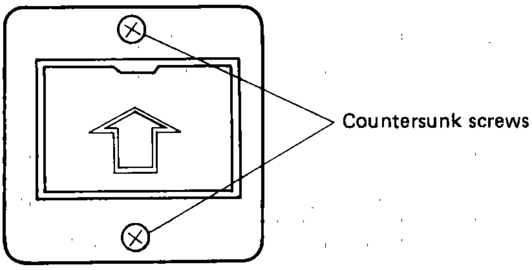


Figure 5-6

6) Reattach the right cover.
7) Insert the control counter II or the control card III unit. Check copier and counter/control card operation.

IV. MOVING THE IMAGE SCANNER

The following steps should be taken if the Image Scanner unit has to be transported to another location by truck, etc., after having been installed.

No.	Procedure Step	Remarks
1.	Remove the Image Scanner connection cable.	
2.	Remove the copyboard glass, and attach the locking plates at the left of the DS unit.	See Figure 5-2
3.	Secure the DS unit to the rails using two cable ties (one each side).	See Figure 5-3
4.	Attach the copyboard glass.	
5.	Secure the Image Editing unit with tape.	
6.	Place the Image Scanner unit in the box.	

I. PARTS TO BE REPLACED PERIODICALLY

There are no components in the Image Scanner unit which need to be replaced periodically.

II. EXPECTED SERVICE LIVES OF CONSUMABLES

The parts listed below may require replacement during the warranty period, but are to be replaced only if they are faulty or worn. The expected service lives of these parts are as follows.

MAY, 1987

No.	Part Name	Part No.	Quantity	Service life No. of Sheets	Remarks
1.	Scanning lamp	FH7-3090-000	1	20,000	
2.	Lamp for LCD	FH7-3092-000	1	One year	3000 hours

Note:
The data given above is only an estimate, and is subject to change with experience.

III. PREVENTIVE MAINTENANCE SERVICE SCHEDULE

Note: Use only the specified solvents and lubricants.

△ : Clean ● : Replace × : Lubricate □ : Adjust ◎ : Inspect

Unit Name	Location	Maintenance Interval					Remarks
		10,000 sheets	20,000 sheets	50,000 sheets	100,000 sheets	250,000 sheets	
Exterior	Copyboard glass	△					Clean with alcohol
	Pressure sheet	△					
Optical path	Fiber optic lens array	△					Lint-free paper
	Reflectors of DS unit	△					Blower brush

Using the troubleshooting tables

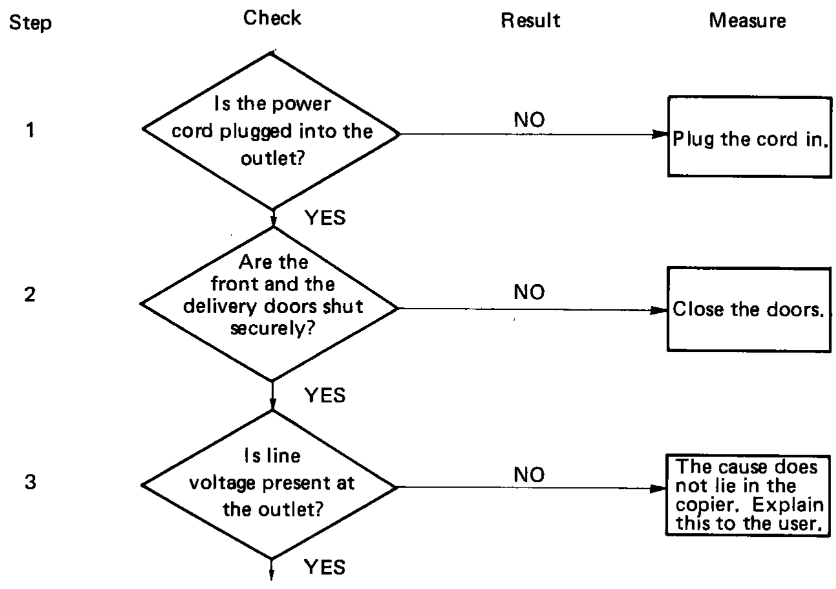
The troubleshooting tables in this chapter are adapted from flow charts. The following example shows how to use these tables.

Example: AC power is not supplied.

Cause/location of fault	Step	Check	Result	Measure
Power plug	1	Is the power cord plugged into the outlet?	NO	Plug the cord in.
Doors not completely shut	2	Are the front and the delivery unit doors shut securely?	NO	Close them fully.
No power	3	Is line voltage present at the outlet?	NO	The cause does not lie in the copier. Explain this to the user.
	4	Is the specified voltage present between JI-1 and JI-2? (J1 is located near the power supply cord mount.)	YES	Go to step 6.

(The rest is omitted.)

- Refer to "Cause/location of fault" for possible causes (defective parts) of a particular problem. In the above example (AC power is not supplied), possible causes are a disconnected power plug, open doors, a dead outlet, etc.
- Follow steps in the given order when trying to determine the cause of a problem. The answer to the question in "Check" is either YES or NO. When the answer agrees with "Result", follow the instruction in "Measure". If this does not solve the problem, proceed to the next step.


Step
Check
Result
Measure
1
Is the power cord plugged into the outlet?
NO
Plug the cord in.
YES
2
Are the front and the delivery doors shut securely?
NO
Close the doors.
YES
3
Is line voltage present at the outlet?
NO
The cause does not lie in the copier. Explain this to the user.
YES

The rest is omitted.

- When a voltage is to be checked with a multimeter, the "Check" column contains an instruction such as "Measure the voltage between J109-1(+) and J109-2(−)." In this instruction, (+) or (−) after the connector No. indicates the terminal to which the positive or the negative probe, respectively, of the multimeter should be connected.

  Example: J109-1(+) .... Positive probe to J109-1
  J109-2(−) .... Negative probe to J109-2

Note:

When an instruction says, "Select <H/V ADJ> of the <ADJUST> SERVICE mode, the sequence of operations is:

- Select SERVICE mode
- Select <ADJUST> from the menu
- Select <H/V ADJUST> from the menu

I. MAINTENANCE AND INSPECTION

A. Basic Image Adjustment Procedure

Refer to Chapter 7 of the Printer Service Manual.

B. Periodic Servicing

Part	Tool/solvent	Servicing/ precaution
Reflector for the scanning lamp	Blower brush	Cleaning
Fiber optic lens array	Lint-free paper	

Part	Tool/solvent	Servicing/ precaution
Copyboard cover cushion	Alcohol	Cleaning
Copyboard glass		

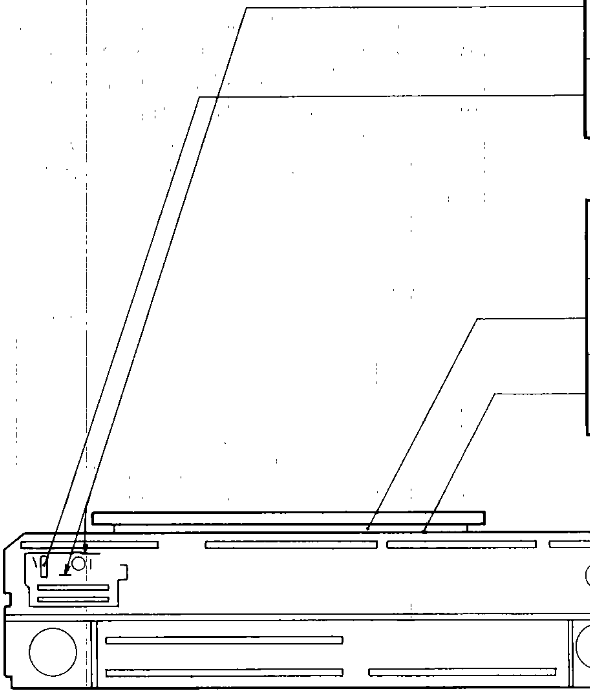


Figure 7-1

II. SPECIFICATIONS AND ADJUSTMENT

A. Mechanical System

1. Leading edge registration

Before adjusting the leading edge registration, check that the leading edge registration in the printer is within tolerance (refer to the Printer Service Manual). Then, follow the procedure of "3. Registration in the horizontal and vertical scanning directions" to make the test print.

When a DIRECT copy is made (not using document size and position sensing mode), the leading edge of the image on the copy (if the leading edge had been reproduced) is within +0.5 /−1.0 mm of the leading edge of the paper.

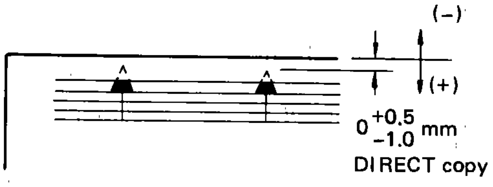

(-)
(+)
$0^{+0.5}_{-1.0}$ mm
DIRECT copy

Figure 7-2

2. Right−left registration

Before adjusting left-right registration, check that right-left registration in the printer is within tolerance (refer to the Printer Service Manual), then follow the procedure of "3. Registration in the horizontal and vertical scanning directions" to make the test print.

When a DIRECT copy is made (not using document size and position sensing mode), the image on the front side of the copy should be within ±2 mm of the edge of the paper.

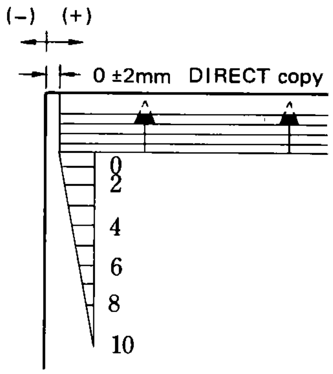

(-) (+)
0 ±2mm DIRECT copy
0
2
4
6
8
10

Figure 7-3

3. Registration in the horizontal and vertical scanning directions

Make this adjustment using <H/V ADJ> of the <ADJUST> service mode.

1) Put a test sheet on the copyboard glass, aligned with the reference mark.
2) Press the "R" key.
3) Set document recognition to OFF.
4) Enter the following numerical values using manually-specified shifting mode.
   X: 50 mm
   Y: 50 mm
5) Make a DIRECT copy.
6) Measure the distances between the leading edge of the image and the leading of the paper, and between the front edge of the image and the front (near) edge of the paper. If both distances are not 50mm, adjust the registration by the procedures of step 7.

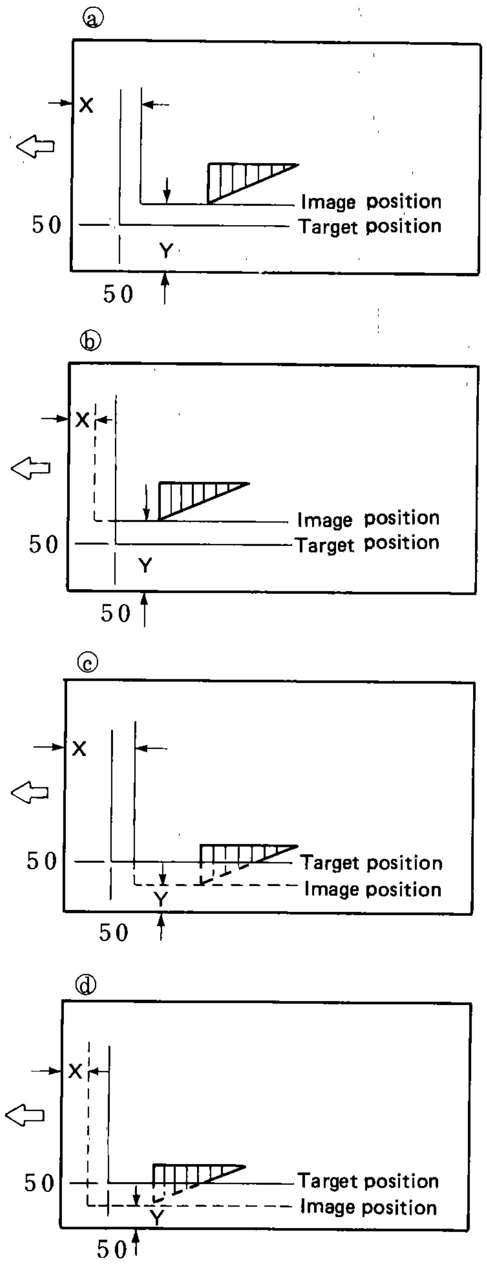

ⓐ
X
50
Y
50
Image position
Target position
ⓑ
X
50
Y
50
Image position
Target position
ⓒ
X
50
Y
50
Target position
Image position
ⓓ
X
50
Y
50
Target position
Image position

Figure 7-4

7) Select <H/V ADJ> of the <ADJUST> SERVICE mode.
   - Change the setting of V-ADJ to adjust registration in the sub-scanning direction (leading edge registration).
     Cases (a) and (c): Decrease V-ADJ.
     Cases (b) and (d): Increase V-ADJ.

   Remarks: V-ADJ changes in units of approx. 0.1 mm.
   - Change the setting of H-ADJ to adjust registration in the main scanning direction (right and left registration).
     Cases (a) and (b): Increase H-ADJ.
     Cases (c) and (d): Decrease H-ADJ.

   Remarks: H-ADJ is done in units of approx. 0.064 mm.

B. Electrical System

1. Adjustment after major replacements

In the scanner assembly, some adjustments are required after major parts have been replaced. These parts and adjustment procedures are described below.

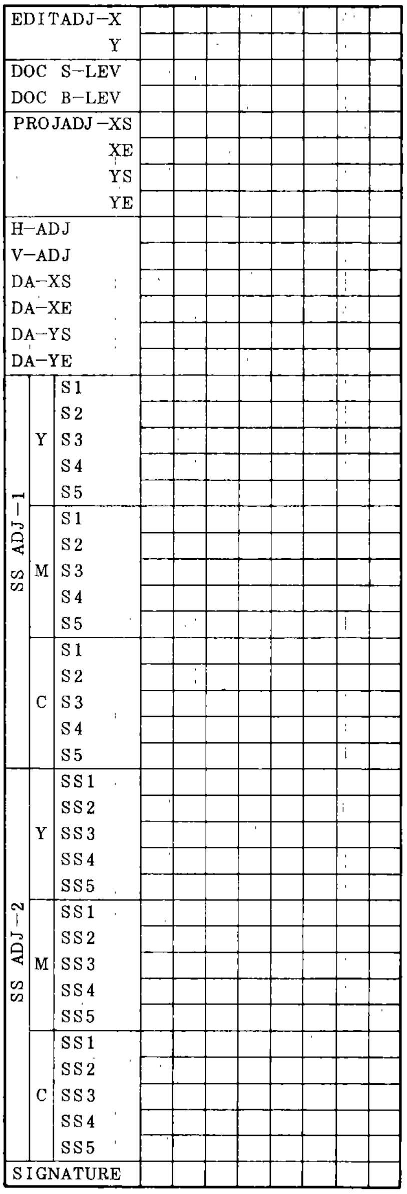
a. After replacing the CPU PCB
  1) Select the <ADJUST> SERVICE mode. Enter the settings again as explained on the label shown in Figure 7-5.
  2) Perform <DOC B-LEV> shown on page 7-42.
  3) Ask the user for data regarding settings that had been entered into memory of the previous CPU PCB, and re-enter the data.

b. After replacing the scanning lamp or CCD pre-amplifier PCB.
  1) Perform <LAMP ADJ> shown on page 7-47.
  2) Perform <DOC B-LEV> shown on page 7-42.

c. After replacing the analog processor PCB, or digital processor PCB.
  1) Perform <LAMP ADJ> shown on page 7-47.
  2) Perform <DOC B-LEV> shown on page 7-42.
  3) Perform <SS ADJ> shown on page 7-49.

d. After replacing the lamp regulator
  1) Perform <LAMP ADJ> shown on page 7-47.

e. After replacing the DS unit
  1) Check whether the DS unit is new or old type. Select "TYPE" of <ROM VER>.
  2) Check and adjust the focusing shown on page 4-7.
  3) Perform <LAMP ADJ> shown on page 7-47.
  4) Perform <DOC B-LEV> shown on page 7-42.
  5) Perform <SS ADJ> shown on page 7-49.



EDITADJ-X										
		Y								
DOC S-LEV										
DOC B-LEV										
PROJADJ-XS										
		XE								
		YS								
		YE								
H-ADJ										
V-ADJ										
DA-XS										
DA-XE										
DA-YS										
DA-YE										
SS ADJ-1	Y	S1								
		S2								
		S3								
		S4								
		S5								
	M	S1								
		S2								
		S3								
		S4								
		S5								
	C	S1								
		S2								
		S3								
		S4								
		S5								
SS ADJ-2	Y	SS1								
		SS2								
		SS3								
		SS4								
		SS5								
	M	SS1								
		SS2								
		SS3								
		SS4								
		SS5								
	C	SS1								
		SS2								
		SS3								
		SS4								
		SS5								
SIGNATURE										

Figure 7-5 SERVICE mode label inside the left cover

2. Photointerrupter check

Photointerrupters may be checked either in the SERVICE mode or with a multimeter in the conventional manner.

(1) Check using SERVICE mode

1) Press the ⧆ key on the control panel, then simultaneously press keys M1 and M4.
2) Press the ⧆ key on the control panel. This selects SERVICE mode.
3) Press the indication (1. DISPLAY).
4) When the next screen is displayed, press the indication (2. SCAN MOTOR).
5) Press the indication (SCAN RLS). This releases the scanner motor brake condition.
6) Check the photointerrupters using Table 7-1.

(2) Check using multimeter

1) Follow steps 1) to 4) of method (1) to select the service mode and release the scanner motor brake.
2) Set the multimeter to the 12 VDC range.
3) Connect the negative probe to J602-6 (GND) on the scanner motor controller PCB.
4) Connect the positive probe successively to each terminal listed in the table below.
5) Check the photointerrupters using Table 7-1.

No.	PD1	PD2	PD3	PD4
Function	Scanner left travel limit sensor (LLIMIT)	Scanner HOME position sensor (SCHP)	Scanner at leading edge sensor (DLEG)	Scanner right travel limit sensor (right) (RLIMIT)
(+) Positive probe	J602-4	J602-1	J602-2	J602-3
Procedure using service mode, the photointerrupter is normal when the result to the right is obtained. Refer to the note.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD1, LMT SENSOR = 1. · Otherwise, LMT SENSOR = 0.	Move the scanner by hand in STANDBY. · When the scanner is at the home position, HP SENSOR = 1. · Otherwise, LMT SENSOR = 0.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD3, DLED SENSOR = 1. · Otherwise, DLED SENSOR = 0.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD4, LMT SENSOR = 1. · Otherwise, LMT SENSOR = 0.
Procedure using a multimeter, the photointerrupter is normal when the result to the right is obtained.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD1, the multimeter reads approx. 5V. · Otherwise, the multimeter reads approx. 0V.	Move the scanner by hand in STANDBY · When the scanner is in the home position, the multimeter reads approx. 5V. · Otherwise, the multimeter reads approx. 0V.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD3, the multimeter reads approx. 5V. · Otherwise, the multimeter reads approx. 0V.	Move the scanner by hand in STANDBY. · When the light blocking plate is in PD4, the multimeter reads approx. 5V. · Otherwise, the multimeter reads approx. 0V.

Table 7-1

Note:
When photointerrupters are checked in the SERVICE mode, LMT SENSOR output may remain at 1 even after the light blocking plate has passed PD1 and PD4. If so, check photointerrupters PD1 and PD4 with a multimeter.

III. IMAGE TROUBLESHOOTING

A. Initial Inspection

1. Installation
   - a. The line voltage should not vary more than ±10V of the voltage marked on the rating plate.
   - b. Avoid very hot and humid locations (near faucets, humidifiers, etc.) cold locations, (near airconditioning outlets, etc.), dusty locations, and places exposed to open flame.
   - c. Do not expose the machine to ammonia gas.
   - d. Avoid direct sunlight. If the machine must be installed near a sunny window, strongly recommend to the client that he install blinds or curtains.
   - e. Install the machine in a well-ventilated room.
   - f. Install the machine on a level floor.
   - g. Keep the machine plugged in at night.

Check if the machine environment satisfies the above requirements.

2. Document check

Check whether the document is the cause of the trouble.

   - a. Check the density of the document.

Example:

When tracing paper is used as the original.	. . . The image may be fogged.
When the original is in light pencil.	. . . The image may be light.

3. Check if the copyboard cover, copyboard glass, or reference white reflector is dirty, discolored, or scratched.

Clean with a moist cloth. Replace any part that is scratched.

4. Check the periodically replaced parts.
   - a. Replace all parts that have already passed their expected service life (refer to the periodic service list).
5. Others

If the machine is moved from a cold storage area directly into a warm room, condensation may form inside the machine and cause various problems.

   - a. Condensation in the DS (Document Scanner) unit (lamp, reflectors, lenses, etc.) causes dark images.

If condensation is observed, wipe off excessive water, then plug in and switch on the machine and leave it for 10 to 20 minutes to warm up.

B. Standard Image

Make full-color (four-color) copies with the CANON CA-1 test sheet. Standard-image copies should satisfy the following conditions of the gray scale, color patches, and 3-color gradation scale (on the test sheet).

1. Gray scale

Scale No. 1 (dark area) should be almost completely solid. The image should become lighter as the scale numbers increase. Scale No. 8 of the light area should be barely visible. Scale No. 9 should be blank.

Halftones should be almost gray, with no tinge of yellow, red, or blue.

2. Color patches

Colors should be distinguished from each another. Colors on the copy should not be much different from those on the test sheet.

3. Photograph

The color balance on the copy should not be much different from that on the original photograph.

4. Three-color gradation scale

All three colors should be close to the primary colors. The image density should decrease as the scale numbers increase. Scale No. 8 should be barely visible and scale No. 9 should be blank.

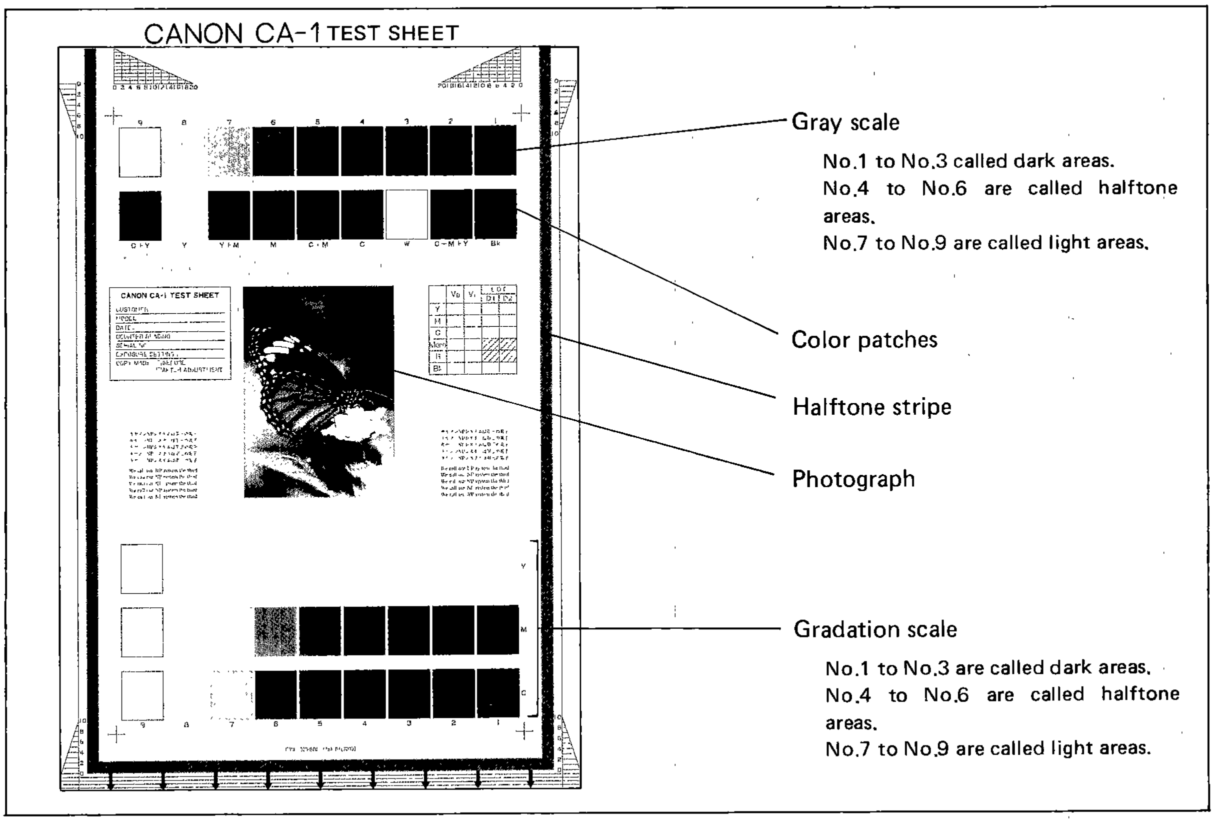
5. Gray scale stripe

Colors of the stripe on the copy should not be much different from those on the test sheet. The image should be even along the entire length of the stripe. Colors near the right and left edges should not differ very much.

No difference in density should be observed across the copy (five CCD blocks).

6. Fogging

The background color of the copy should not be much different from that of the test sheet.



No.1 to No.3 called dark areas.
No.4 to No.6 are called halftone areas.
No.7 to No.9 are called light areas.

No.1 to No.3 are called dark areas.
No.4 to No.6 are called halftone areas.
No.7 to No.9 are called light areas.

Figure 7-6

C. Examples of Faulty Images

Typical examples of faulty images caused by the scanner are shown below. Samples were made in full color with the CA-1 test sheet.

1. Images do not appear for some of the five CCD blocks (channels).
   - Refer to "Troubleshooting by image fault". (No image for CH4)

2. Difference in density between CCD blocks (channels).
   - Refer to "Troubleshooting by faulty image". (Magenta of CH3 is too strong.)

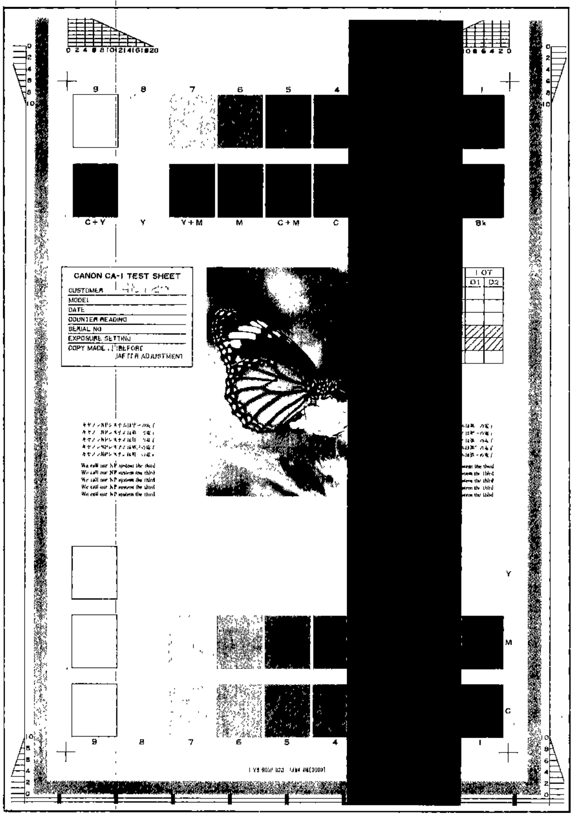


Figure 7-7

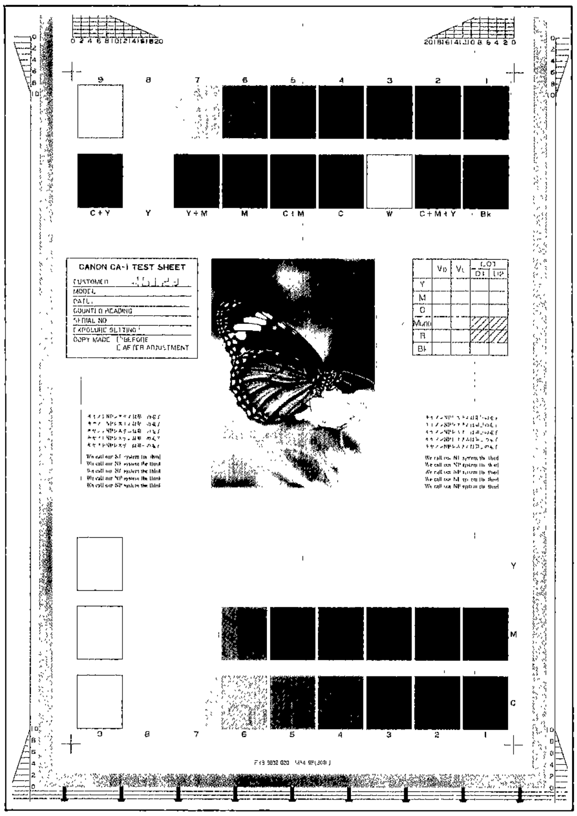


Figure 7-8

D. Test Printing

1. Vertical stripe test print (T1)

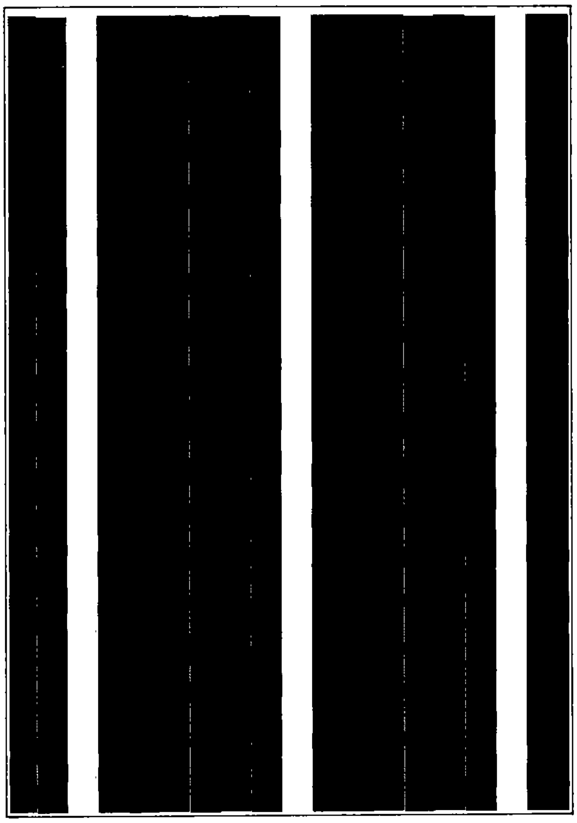


Figure 7-9

2. 256-gradation test print (T2)
- Check of tone reproduction.

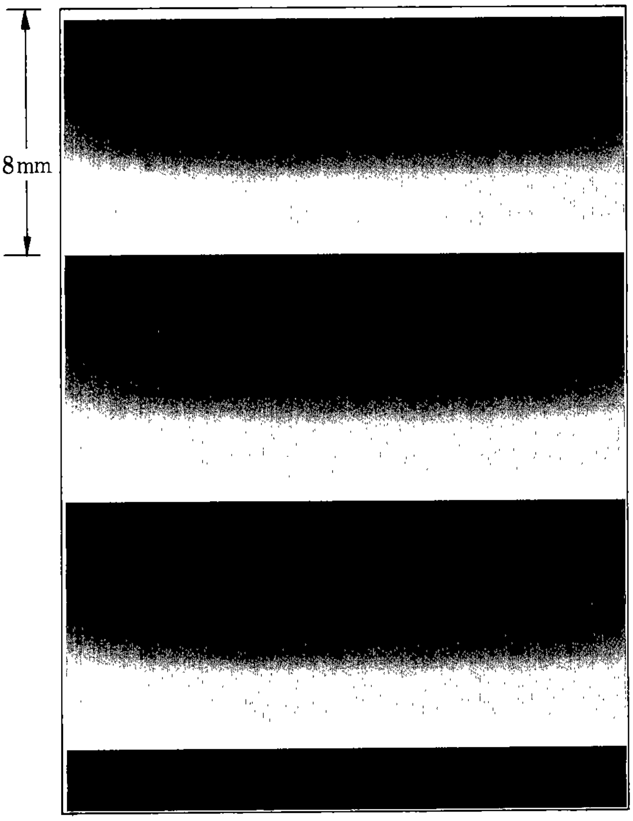


Figure 7-10

3. Overall halftone test print (T3)

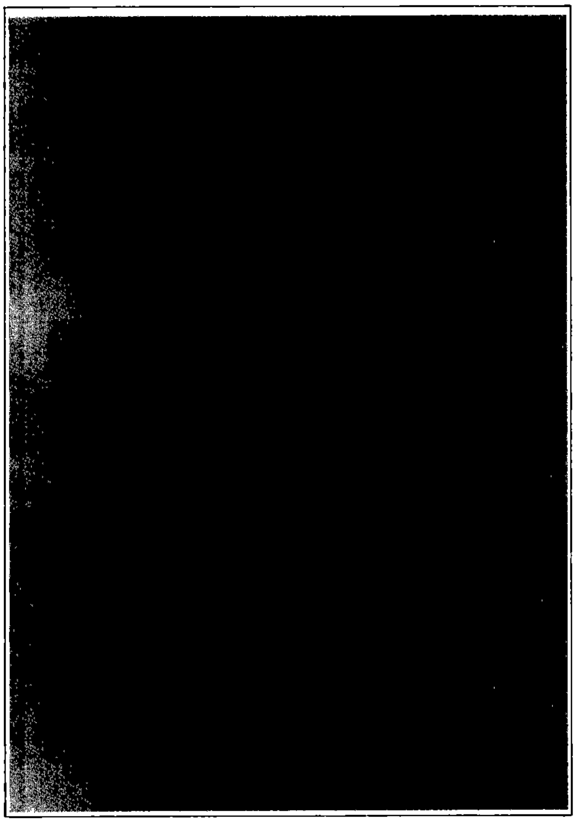


Figure 7-11

Reference:
Test prints T1 and T3 area produced by the shading compensation circuit of the digital processor; test print T2 is produced by the color conversion circuit.

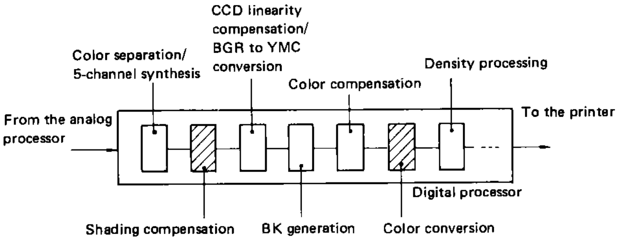

CCD linearity compensation/ BGR to YMC conversion
Color separation/ 5-channel synthesis
Density processing
Color compensation
From the analog processor
To the printer
Digital processor
Shading compensation
BK generation
Color conversion

Figure 7-12

E. Troubleshooting by Image Fault

1. Solid image

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1</td><td>Does the scanning lamp go ON?</td><td>NO</td><td>Refer to the section "Scanning lamp does not go ON".</td></tr>
<tr><td></td><td>2</td><td>Are copy images normal on test prints made in the SERVICE mode?</td><td>YES</td><td>Go to step 4.</td></tr>
<tr><td>Digital processor PCB</td><td rowspan="2">3</td><td rowspan="2">Is 5 VDC present at J403-1 and -2 on the digital processor PCB?</td><td>YES</td><td>Replace the digital processor PCB. After replacing it, perform the adjustment shown on page 7-3.</td></tr>
<tr><td>DC power supply</td><td>NO</td><td>Refer to the section "DC power is not supplied".</td></tr>
<tr><td>Connectors</td><td>4</td><td>Are the following connectors installed correctly?
· CCD driver PCB J201 to J207
· CCD pre-amplifier PCB J101 to J111
· Analog processor PCB J301 to J308
· Digital processor PCB J407</td><td>NO</td><td>Reinstall the connectors correctly.</td></tr>
<tr><td>DC power supply</td><td>5</td><td>Connect the probes to the following connectors. Are the multimeter readings as shown?
<table>
<tr><th></th><th>(+) probe</th><th>(−) probe</th><th>Reading</th></tr>
<tr><td rowspan="2">CCD driver PCB</td><td>J202-1 (5V)</td><td>J202-2 (GND)</td><td>5V</td></tr>
<tr><td>J202-3 (12V)</td><td>J202-4 (GND)</td><td>12V</td></tr>
<tr><td rowspan="2">CCD pre-amplifier PCB</td><td>J111-2 (GND)</td><td>J111-1 (−5V)</td><td>5V</td></tr>
<tr><td>J111-4 (5V)</td><td>J111-3 (GND)</td><td>5V</td></tr>
<tr><td rowspan="3">Analog processor PCB</td><td>J308-3 (5V)</td><td>J308-1 (GND)</td><td>5V</td></tr>
<tr><td>J308-5 (GND)</td><td>J308-4 (−5V)</td><td>5V</td></tr>
<tr><td>J308-6 (5V)</td><td>J308-5 (GND)</td><td>5V</td></tr>
</table></td><td>NO</td><td>Refer to the section "DC power is not supplied".</td></tr>
<tr><td>DS unit</td><td rowspan="2">6</td><td rowspan="2">Is the problem eliminated by replacing the DS unit?</td><td>YES</td><td>End</td></tr>
<tr><td>Analog processor PCB.</td><td>NO</td><td>Replace the analog processor PCB. After replacing it, perform the adjustment shown on page 7-3.</td></tr>
</table>

2. Light image

Location/type of fault	Step	Check	Result	Measure
	1	Are 16-gradation test prints by the printer normal?	NO	Refer to the sectin "Light image" of the printer service manual.
Cleanliness of optical surfaces in scanner. Scanning lamp instensity.	2	Clean the scanning lamp, reflector, lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet), then perform <LAMP ADJ> shown in page 7-47. Does the image improve?	YES	End
Scanning lamp	3	Is the scanning lamp blackened?	YES	Replace the lamp. After replacing it, perform the adjustment shown on page 7-3.
<WHITE ADJ>	4	Perform <DOC B-LEV> shown in page 7-42. Does the image improve?	YES	End
	5	Make a 256-gradation test print in the SERVICE mode. Are gradations (darker areas in particular) normal?	YES	Go to step 8.
Connectors	6	Are the following connectors connected securely? Image Scanner – J404, J21 Printer – J86, J108	NO	Reinstall or replace connectors.
Cable	7	Is there continuity between the following connectors? Image Scanner Digital processor PCB – Printer DC controller PCB J404-1 – J108-1 -2 – -2 -16 – -16	NO	Replace the cable.
Digital processor PCB			YES	Replace the digital processor PCB.
Digital processor PCB	8	Select the TEST PRINT mode. Make an overall halftone print in the following three degrees of density. · 60 · 70 · 140 Is the image dark when the density is 60 and light when it is 140?	NO	Replace the digital processor PCB.
Scanning lamp, DS unit, Analog processor PCB, Digital processor PCB.			YES	Replace the following parts in this order, then perform the adjustment shown on page 7-3. · Scanning lamp · DS unit · Analog processor PCB · Digital processor PCB

3. Fogged image

Location/type of fault	Step	Check	Result	Measure
	1	Are 16-gradation test prints by the printer normal?	NO	Refer to the section "Fogging" of the printer service manual.
Cleanliness of optical surfaces in scanner, Scanning lamp intensity	2	Clean the scanning lamp, reflector, lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet), then perform <LAMP ADJ>. Does the image improve after taking these measures?	YES	End
Scanning lamp	3	Is the scanning lamp blackened?	YES	Replace the lamp. After replacing it, perform the adjustment shown on page 7-3.
<DOC B-LEV>			NO	Adjust <DOC B-LEV>. (See page 7-47)

4. No image from a CCD block (channel)

Location/type of fault	Step	Check	Result	Measure
Connectors Wiring	1	Are the following connectors connected securely? Does wiring between connectors appear normal? · CCD driver PCB J203 to J207 · CCD pre-amplifier PCB J101 to J110 · Analog processor PCB J301 to J307	NO	Reinstall connectors or replace wiring.
Analog processor PCB, Digital processor PCB	2	Switch off DOCUMENT DETECTION, then make one copy. Set the power switch OFF. Disconnect connectors J303 through J307 on the analog processor PCB and reconnect each to a different connector (at random). Set the power switch ON, then make a copy. Is the location of blank areas different on this copy?	NO	Replace the analog or digital processor PCB. After replacing it, perform the adjustment shown on page 7-3.
DS unit	3	Set the power switch OFF, then reconnect J303 through J307 correctly, and change the connection of connectors J101 through J105 on the CCD pre-amplifier PCB in the same way (at random). Set the power switch ON and switch off DOCUMENT DETECTION, then make a copy. Are the locations of blank areas different on this copy? (Reconnect J101 through J105 correctly.)	YES	Replace the DS unit.
CCD pre-amplifier PCB			NO	Replace the CCD pre-amplifier PCB. (The entire DS unit may be replaced.)

5. Difference in density between CCD blocks (channels)

Location/type of fault	Step	Check	Result	Measure
	1	Are 16-gradation test prints by the printer normal?	NO	Refer to the section "Uneven density" of the printer service manual.
Data of <SS ADJ>	2	Check the data shown for <SS ADJ>. Are they the same as the values written on the label shown on Figure 7-5?	NO	Input the values of the label for the display of <SS ADJ>.
Adjustment	3	Did the problem occur after one of the following parts was replaced? · CPU PCB · Scanning lamp · DS unit · CCD pre-amplifier PCB · Analog processor PCB · Digital processor PCB · Lamp regulator	YES	Take the measures described on page 7-3.
Scanning lamp intensity	4	Clean the scanning lamp, reflector, lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet), then perform <LAMP ADJ> in the SERVICE mode. Does the image improve after taking these measures?	YES	End
Scanning lamp	5	Is the scanning lamp blackened?	YES	Replace the lamp. After replacing it, perform the adjustment shown in page 7-3.
Connectors	6	Are connectors J301 and J302 on the analog processor PC board installed securely?	NO	Reinstall or replace the connectors.
<DOC B-LEV> <SS ADJ>	7	Adjust the <DOC B-LEV> shown on page 7-42, then <SS ADJ> shown on page 7-49. Does the image improve?	YES	End
Scanning lamp DS unit Analog processor PCB Digital processor PCB			NO	Replace the following parts in this order. · Scanning lamp · DS unit · Analog processor PCB · Digital processor PCB After replacing these, perform the adjustment shown on page 7-3.

6. Dark, color or white lines in paper-feed direction

Location/type of fault	Step	Check	Result	Measure
Wall outlet	1	Is the voltage of the wall outlet correctly during copying?	NO	• Unplug the scanner power cord from the printer AC outlet, and plug the cord into a wall outlet. • Explain to the user that the wall outlet is poor.
	2	Are 16-gradation test prints normal?	NO	Refer to the Printer Service Manual.
Cleanliness of optical surfaces in scanner Scanning lamp intensity	3	Clean the scanning lamp, reflector, lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet). Does the image improve?	YES	End
Scanning lamp	4	Is the scanning lamp blackened?	YES	Replace the lamp. After replacing it, perform the adjustment shown on page 7-3.
DS unit			NO	Replace the DS unit. After replacing it, perform the adjustment shown on page 7-3.

7. Unsharp (Unfocused) image

Location/type of fault	Step	Check	Result	Measure
	1	Are the halftone test prints by the printer normal?	NO	Check the printer.
Copyboard glass	2	Is the position of the copyboard glass correctly?	NO	Reinstall it.
Copyboard glass Copyboard cover Lens array	3	Does the image improve after cleaning the copyboard glass, copyboard cover and lens array?	YES	End
Hinge Copyboard cover	4	Does the copyboard cover press down the document?	NO	Check the hinges and copyboard cover.
Grounding plate	5	Is the position of the grounding plate of the copyboard glass correctly?	NO	Reinstall it.
Rail Hight positioning slider	6	Does the image improve after cleaning the rails and the hight positioning slider of the DS unit?	YES	End
Focus adjustment			NO	Adjust the focus of the DS unit shown on page 4-7.

IV. OPERATION TROUBLESHOOTING

A. Troubleshooting by faulty operation

1. E205 indication

Location/type of fault	Step	Check	Result	Measure
	1	Was the scanner operating normally until the E205 indication lit?	NO	Refer to "Scanner does not advance or return".
DC power supply	2	Connect the probes to the following connectors of the scanner motor controller PCB. Are the reads of multimeter correctly? (+) probe (+) probe Reading J604-4 (5V) J604-3 (GND) 5V J604-1 (24V) J604-2 (GND) 24V	NO	Refer to "DC power is not supplied".
Connectors, wiring	3	Are connectors J604 on the scanner motor controller PCB and J503 on the CPU PCB installed securely? Is wiring between these connectors normal?	NO	Reinstall or replace the connectors.
Scanner motor control PCB	4	Is the problem eliminated by replacing the scanner motor controller PCB?	YES	End
CPU PCB			NO	Replace the CPU PCB.

2. E302 indication

Location/type of fault	Step	Check	Result	Measure
Standard white sheet	1	Is the standard white sheet normal?	NO	Reinstall it.
	2	Turn the power switch OFF, then ON. Cancel the DOCUMENT DETECTION, and select the SERVICE mode. Press (PRINT) key of <DOC LEV> or <PROJ ADJ>. Does the image fit below cases? · Scanning lamp does not go ON. · Solid image · Light image · Fogged image · No image from a CCD block (channel) · Difference in density between CCD blocks (channels) · Dark, color or white line · Unsharp (unfocussed) image	YES	Refer to each troubleshooting.
CPU PCB			NO	Replace the CPU PCB.

3. E620 indication

Location/type of fault	Step	Check	Result	Measure
DC power supply	1	Place the editor upside down. Remove the editor control cover. Is 5 VDC present at the editor controller PCB? (The 5V and GND test points are identified on the board.)	NO	Check wiring connected to the DC power supply. If power supply is normal, refer to "DC power is not supplied".
Connectors, wiring	2	Are connector CN1 (on the editor controller PCB) and J504 (on the CPU PCB) installed securely? Does wiring between these connectors appear normal?	NO	Reinstall or replace the connectors.
Editor controller PCB	3	Is the problem eliminated by replacing the editor controller PCB?	YES	End
CPU PCB			NO	Replace the CPU PCB.

4. E700 indication

Location/type of fault	Step	Check	Result	Measure
Connectors, wiring	1	Are the following connectors installed securely? Does wiring between connectors appear normal? Scanner · J404 and J405 on the digital processor PCB · J505 on the CPU PCB Printer · J108 on the DC controller PCB	NO	Reinstall or replace connectors.
Digital processor PCB, CPU PCB, DC controller PCB			YES	Scanner · Replace the digital processor PCB. · Replace the CPU PCB. Printer · Replace the DC controller PCB.

5. AC power not supplied

Location/type of fault	Step	Check	Result	Measure
Printer AC outlet	1	Unplug the power cord from the printer AC outlet. Does the scanner operate when the cord is plugged into a wall outlet?	YES	Refer to the section "AC power is not supplied" of the printer service manual.
Circuit breaker (CB1)	2	Check continuity between the terminals of the circuit breaker (CB1). Is the resistence 0Ω ?	NO	Press the reset button and check continuity again. If the resistence is not 0Ω, replace the circuit breaker (CB1). · After replacing it, determine what caused the circuit breaker to cut out or become faulty.
Power switch (SW1)	3	Connect a multimeter between both pairs of terminals (1a and 1b, 2a and 2b) of power switch SW1. Is the resistence 0Ω when the switch is ON? Is the resistence ∞Ω when the switch is OFF?	NO	Replace SW1.
Power cord, Line filter (LF1), Wiring			YES	Check the power cord, Line filter (LF1), and wiring. Replace them if necessary.

6. DC power not supplied

Location/type of fault	Step	Check	Result	Measure
AC power	1	Is AC power supplied between J8-1 and J8-4 on the DC power supply PCB?	NO	Refer to "AC power is not supplied".
DC power supply protective circuit	2	Set the power switch OFF, unplug the power cord, then disconnect J1 through J7 on the DC power supply PCB. Wait about one minute, connect the power plug, then set the power switch ON. Connect the probes to the following connectors of the DC power supply PCB. Are all readings of the multimeter as shown?	YES	The DC power supply PCB is normal, but the protective circuit of the DC power supply PCB had operated. Correct the fault. Connect J1 through J7, then turn on the power.
DC power supply			NO	Replace the DC power supply PCB.

(+) probe	(−) probe	Reading
J1-1 (CN7-1)	J1-3 (CN7-3)	5V
J1-2 (CN7-2)	J1-4 (CN7-4)	5V
J1-3 (CN7-3)	J1-5 (CN7-5)	5V
J1-4 (CN7-5)	J1-6 (CN7-6)	5V
J2-1 (CN6-1)	J2-3 (CN6-3)	12V
J2-2 (CN6-2)	J2-4 (CN6-4)	12V
J3-1 (CN5-1)	J3-5 (CN5-5)	5V
J3-2 (CN5-2)	J3-6 (CN5-6)	5V
J3-3 (CN5-3)	J3-7 (CN5-7)	5V
J3-4 (CN5-4)	J3-8 (CN5-8)	5V
J4-1 (CN4-1)	J4-5 (CN4-5)	5V
J4-2 (CN4-2)	J4-6 (CN4-6)	5V
J4-3 (CN4-3)	J4-7 (CN4-7)	5V
J4-4 (CN4-4)	J4-8 (CN4-8)	5V
J5-1 (CN3-1)	J5-3 (CN3-3)	24V
J5-2 (CN3-2)	J5-4 (CN3-4)	24V
J6-1 (CN2-1)	J6-5 (CN2-5)	24V
J6-2 (CN2-2)	J6-6 (CN2-6)	24V
J6-3 (CN2-3)	J6-7 (CN2-7)	24V
J6-4 (CN2-4)	J6-8 (CN2-8)	24V
J7-1 (CN1-1)	J7-2 (CN1-2)	12V
J7-2 (CN1-2)	J7-3 (CN1-3)	12V

7. Scanner does not advance or return

Location/type of fault	Step	Check	Result	Measure
Drive cable, Belt, Ribbon cable	1	Are the scanner drive cable and the capstan drive belt installed correctly? Is the ribbon cable from the DS unit routed correctly?	NO	Reinstall the cable, belt or ribbon cable.
Drive capstan	2	Is the setscrew that secures the cable drive pulley to the shaft loose?	YES	Tighten the setscrew. Adjust squareness. (See chapter 4.)
Scanner position sensors	3	Are scanner position sensors (PD1 to PD4) functioning correctly? (Refer to "Photointerrupter check" on page 7-4.)	NO	Replace any defective sensor.
Scanner motor (M1)	4	Set the power switch OFF, then disconnect connector J603 on the motor controller PCB. Is the resistence between the terminals of J603 of the motor 3Ω ?	NO	Replace the scanner motor.
DC power supply	5	Connect J603, then set the power switch ON. Connect the probes to the following connectors. Are the readings of the multimeter as shown? (+) probe (−) probe Reading J604-1 J604-2 24VDC J604-4 J604-3 5VDC	NO	Refer to "DC power is not supplied".
	6	Does the scanner go to the home position when the power switch is set ON?	YES	Go to step 8.
Scanner motor (M1)	7	Set the power switch OFF. Set the multimeter to the 12VDC range. Connect the negative probe to J604-2 (GND). Set the power switch ON. Connect the positive probe successively to J603-1 through -5. Is there a voltage at each?	YES	Replace the scanner motor.
Scanner motor controller PCB	8	Is the problem eliminated by replacing the scanner motor controller PCB?	YES	End
CPU PCB			NO	Check wiring. If wiring appears normal, replace the CPU PCB.

8. Scanning lamp does not go ON.

Location/type of fault	Step	Check	Result	Measure
Lamp installation	1	Is the lamp installed correctly?	NO	Reinstall the lamp.
Thermal fuse (FU1)	2	Check continuity between the terminals of the thermal fuse (FU1).	NO	Replace the thermal fuse (FU1). Note: The fuse may have melted by overheating of the lamp, incorrect fuse position, cooling fan malfunction, etc. Check possible causes after replacing the fuse.
Lamp	3	Disconnect connector J15 (2P). Set the multimeter to the 1 kΩ resistance range. Does the needle deflect when the probes are connected to the pairs of electrodes at both ends of the lamp?	NO	Replace the lamp.
Wiring	4	Connect J15. Set the multimeter to the 250VDC range. Connect the positive probe to J10(CN2)-1 and the negative probe to J10(CN2)-3. Does the voltage increase from approx. 0V to approx. 70V when the COPY START key is pressed?	YES	Check wiring between the lamp regulator PCB and the lamp.
AC power supply	5	Is AC power supplied between J9(CN1)-1 and J9(CN1)-2 of the lamp regulator PCB?	NO	Refer to "AC power is not supplied".
DC power supply	6	Set the multimeter to the 50VDC range. Connect the positive probe to J11(CN3)-2 and the negative probe to J11(CN3)-4. Does the multimeter read approx. 24V?	NO	Refer to "DC power is not supplied".
Lamp regulator	7	Set the multimeter to the 50VDC range. Connect the positive probe to J11(CN3)-4 of the lamp regulator PCB and the negative probe to J11(CN3)-3. Does the voltage decrease from approx. 24V to approx. 0V when the COPY START key is pressed?	YES	Replace the lamp regulator PCB.
Wiring, CPU PCB			NO	Check wiring between the lamp regulator PCB and the CPU PCB. If the wiring is normal, replace the CPU PCB.

9. Projector lamp does not go ON.

Location/type of fault	Step	Check	Result	Measure
	1	When the PROJECTOR key is pressed, does the touch panel show the projector screen?	NO	Go to step 12.
Power supply	2	Does the projector power indicator LED go ON?	NO	Go to step 8.
	3	Does the fan run?	NO	Go to step 7.
Projector lamp	4	Unplug the projector power cord, then remove the lamp. (Observe the usual precautions for handling a tungsten halogen lamp.) Set the multimeter to the × 1kΩ range. Does the needle deflect when the probes are connected to the terminals of the lamp?	NO	Replace the lamp
Thermal fuse	5	Is the thermal fuse melted (open circuit)?	NO	Replace the thermal fuse. · Determine the cause of the melted fuse.
Wiring, Cover position switch (SW2)	6	Remove the lamp cover, and reinstall the lamp. Set the multimeter to the × 1kΩ range. Disconnect J7(2P) of the projector. Connect the multimeter probes to the lamp part of J7(2P). Does the needle deflect when the lamp door switch (SW2) is actuated?	NO	Check wiring and check if the switch can be heard to operate when the cover is opened and closed. If no faults are found, replace the switch (SW2).
Projector power supply PCB			YES	Replace the projector power supply PCB.
Projector power supply PCB	7	Set the multimeter to the 10VDC range. Connect the positive probe to J14-3 of the projector power supply PCB and the negative probe to J14-2. Does the voltage rise above approx. 2V when the "FOCUS" key is pressed?	YES	Replace the projector power supply PCB.
Wiring, CPU PCB			NO	Check wiring between J14 to J502 on the CPU PCB. When the wiring is normal, replace the CPU PCB.
Power cord	8	Is the projector power cord plugged in correctly?	NO	Connect the cord correctly.
Circuit breaker	9	Unplug the projector power cord. Is there continuity between the terminals of the circuit breaker (BK1)?	NO	Press reset button of the circuit breaker and check it for continuity. · If there is no continuity, replace the circuit breaker. · If there is continuity, the circuit breaker is normal. Determine why the circuit breaker tripped.
Projector power supply PCB	10	Plug in the projector power cord. Set the multimeter to the 250VAC range. Connect the probes to J11-1 and J11-2 on the projector power supply PCB. Press the PROJECTOR key to select PROJECTOR mode. Is AC line voltage present?	YES	Replace the projector power supply PCB.

Location/type of fault	Step	Check	Result	Measure
Relay (RL1)	11	Set the multimeter to the 50VDC range. Connect the positive probe to the projector port of J34(J1)-2 and the negative probe to J34(J1)-1. Press the PROJECTOR key to select PROJECTOR mode. Does the voltage increase from approx. 0V to approx. 24V?	YES	Replace the relay (RL1).
Wiring, CPU PCB			NO	Check wiring from J34(J1) to J502 on the CPU PCB. When the wiring is normal, replace the CPU PCB.
Wiring	12	Set the multimeter to the 1kΩ range. Does the needle deflect when the probes are connected to J34-3 and J34-5 of the projector?	NO	Check the wiring inside the projector.
CPU PCB	13	Connect the multimeter probes to J502-1 and J502-2 on the CPU PCB. Does the needle deflect?	YES	Replace the CPU PCB.
Wiring			NO	Check the wiring between J502 and J34. Replace the wiring if necessary.

10. Touch-panel display (LCD panel) does not operate.

Location/type of fault	Step	Check	Result	Measure
	1	Are other keys and indications on the control panel normal?	NO	Go to step 8.
Touch panel glass	2	Is the surface glass of the touch panel display cracked?	YES	Replace the glass. • The glass may crack if pressed by a pointed object, such as a pen.
	3	Is the lamp of the LCD ON?	YES	Go to step 6.
Lamp of LCD	4	Set the power switch OFF. Set the multimeter to the 1000 VAC range. Connect the positive probe to J31(OUT1)-3 and the negative probe to J31-1 of the LCD panel power supply PCB. Does the needle deflect when the power switch is set ON?	YES	Replace the lamp.
LCD power supply PCB	5	Set the multimeter to the 50VDC range. Connect the positive probe to J32(INPUT)-1 and the negative probe to J32-3 on the LCD power supply PCB. Does the multimeter read approx. 24 VDC?	YES	Replace the LCD power supply PCB.
DC power supply			NO	Refer to "DC power is not supplied".
LCD power supply PCB	6	Set the multimeter to the 50VDC range. Connect the positive probe to J30(OUT3)-3 and the negative probe to J30-1 on the LCD power supply PCB. Does the multimeter read approx. 5VDC?	NO	Replace the LCD power supply PCB.
DC power supply	7	Set the multimeter to the 10VDC range. Connect the positive probe to J25(J1)-2 and the negative probe to J25-1 on the control panel PCB 1. Does the multimeter read approx. 5V?	NO	Refer to "DC power is not supplied".
Connectors	8	Are all connectors of the control panel, connector J406 on the CPU PCB, and wiring correct?	NO	Reinstall or replace connectors and wiring.
Control panel PCB 1, LCD unit, CPU PCB			YES	Replace the control panel PCB 1, LCD unit, or CPU PCB.

11. Document is not detected.

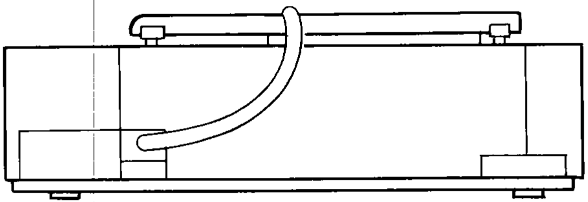
Location/type of fault	Step	Check	Result	Measure
	1	Are copies black when DOCUMENT DETECTION is cancelled?	YES	Refer to troubleshooting for "Solid image".
Document detection sensitivity	2	Is the problem eliminated by adjusting the document detection sensitivity in the <DOC S-LEV> service mode?	YES	End
Digital processor PCB			NO	Replace the digital processor PCB.

12. The instruction "Connect the printer to the scanner and turn the printer power ON" does not go OFF. (defective PPRDY)

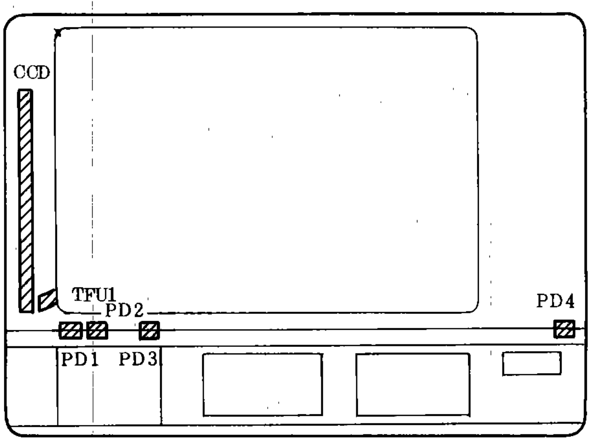
Location/type of fault	Step	Check	Result	Measure
Printer DC power supply	1	Is DC power present at the DC controller PCB of the printer?	NO	Refer to the section "DC power is not supplied" for the printer service manual.
DC power supply	2	Set the multimeter to the 10VDC range. Connect the probes to the following connectors of the digital processor PCB. Does the multimeter read approx. 5V in each case? (+) probe (−) probe J403-1 J403-3 J403-2 J403-4	NO	Refer to "DC power is not supplied".
Connectors, Wiring	3	Are the following connectors installed securely? Does the wiring between the connectors appear correct? Scanner · J405 on the digital processor PCB · J505 on the CPU PCB · J404-35 (PPRDY) on the digital processor PCB Printer · J108-35 (PPRDY) on the DC controller PCB	NO	Reconnect or replace connectors.
Digital processor PCB, CPU PCB, DC controller			YES	Scanner · Replace the digital processor PCB. · Replace the CPU PCB. Printer · Replace the DC controller PCB.

V. ELECTRICAL COMPONENTS

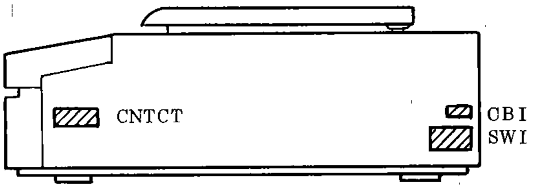
A. Sensors, Switches, Circuit Breakers, and Counters



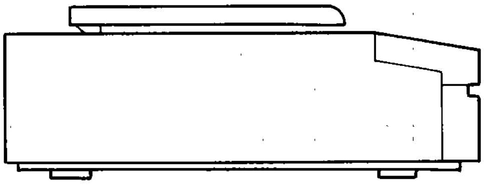
Rear view



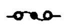
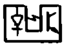
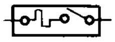
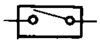
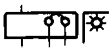
Top view



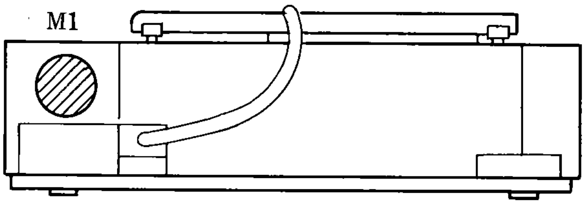
Right view



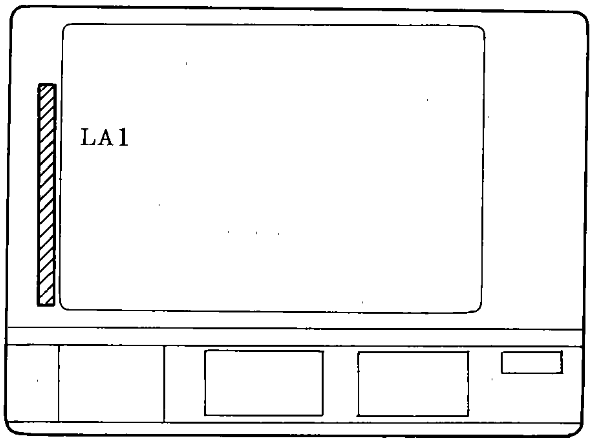
Left view

Symbol	Description	Abbreviation	Function
	Thermal fuse	TFU1	Cuts power from abnormally hot scanning lamp
	Photointerrupter	PD1 PD2 PD3 PD4	Senses scanner at travel limit (left) Senses scanner at home position Senses scanner at document leading edge Senses scanner at travel limit (right)
	Circuit breaker	CB1	Prevents excess current
	Switch	SW1	Power switch
	Counter	CNTCT	Control counter/Control Card unit
	CCD		Digitizing optical image

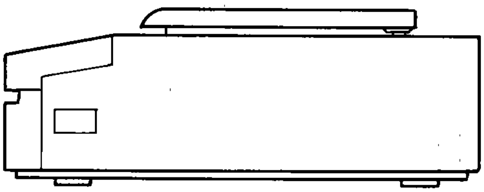
B. Lamp, Motor and Fan



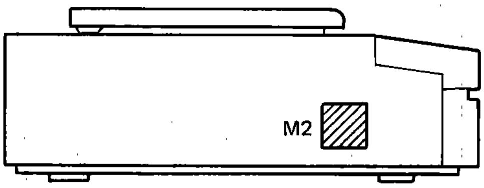
Rear view



Top view



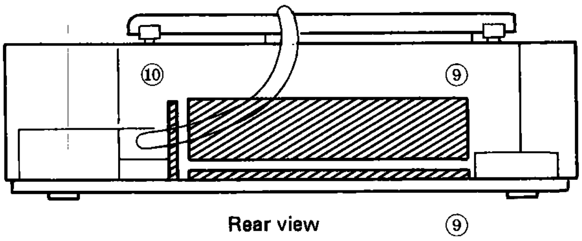
Right view



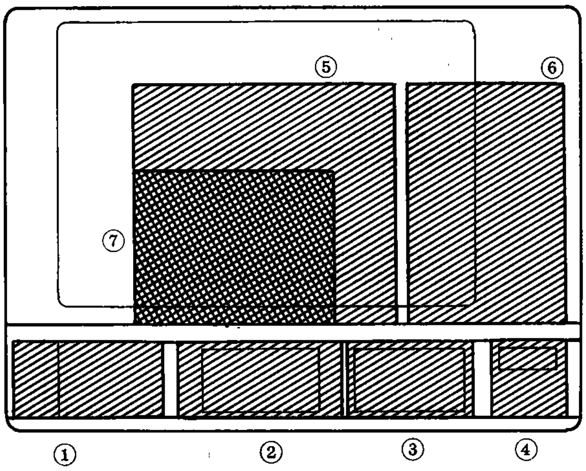
Left view

Symbol	Description	Abbreviation	Function
	Tungsten-halogen lamp	LA1	Illuminating document on copyboard for scanning the original
	Motor	M1	Driving scanner
	Fan motor unit	M2	Cooling the scanner

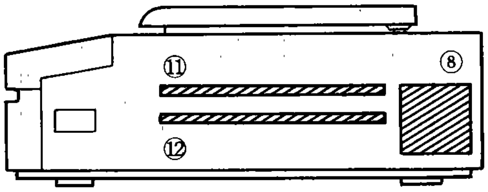
C. PC Boards



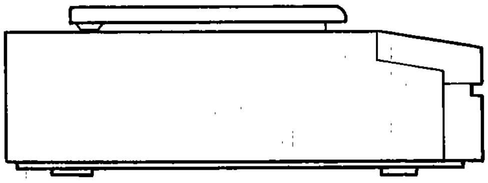
Rear view



Top view



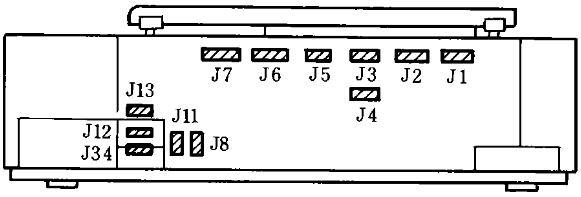
Right view



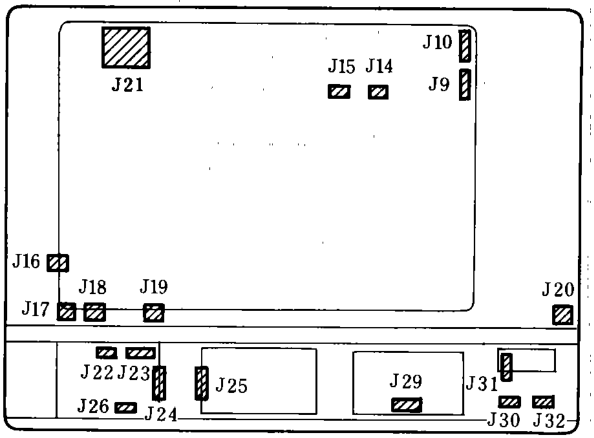
Left view

No.	Description	Function
①	Control panel PCB1	Operates/reads keys, LEDs
②	LCD panel unit	Indication/input
③	Control panel PCB2	Operates/reads keys, LEDs
④	LCD panel power supply PCB	Powers LCD panel
⑤	Digital processor PCB	Digital image processing
⑥	Analog processor PCB	Analog image processing
⑦	CPU PCB	Controls operations, performs image processing
⑧	Scanner motor controller PCB	Controls scanner motor
⑨	DC power supply PCB	Supplies DC power
⑩	Lamp regulator PCB	Operates scanning lamp
⑪	CCD driver PCB	Operates CCD
⑫	CCD pre-amplifier PCB	Amplifies CCD output

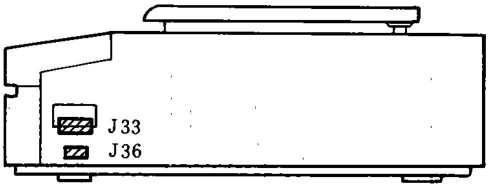
D. Connectors



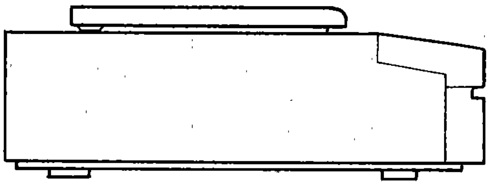
Rear view



Top view



Right view



Left view

Connector No.	No. of pins	Connection	Connector No.	No. of pins	Connection
J1 (CN7)	6	To J308, J14 (for analog circuits)	J16	3	Scanner cooling fan
J2 (CN6)	4	To J14 (for CCD)	J17	3	Scanner home position sensor
J3 (CN5)	8	To J12, J14, and J308 (for digital circuits)	J18	3	Scanner travel limit sensor (left)
J4 (CN4)	8	To J403, J501, and J604 (for digital circuits)	J19	3	Scanner at document leading edge sensor
J5 (CN3)	4	To J11 (for lamp regulator)	J20	3	Scanner travel limit sensor (right)
J6 (CN2)	8	To J16, J32, and J604 (for M1)	J21	40	To printer
J7 (CN1)	4	To J12 (for editor)	J22	2	To DC power supply PCB
J8 (CN1)	5	From the power switch (AC input)	J23	34	To CPU PCB
J9 (CN1)	4	From the power switch (AC input)	J24	50	To LCD control panel unit
J10(CN2)	3	To J15 (lamp output)	J25	50	To control panel PCB1
J11(CN3)	4	To J5, J5021	J26	20	To control panel PCB2
J12	9	To editor (power supply)	J29	20	To control panel PCB1
J13	15	To editor	J30	3	To LCD control panel unit
J14	9	DS unit – DC power supply PCB	J31	3	To lamp of LCD
J15	2	Scanning lamp – lamp regulator PCB	J32	3	To DC power PCB
			J33	4	To control counter/card unit
			J34	6	To projector
			J36	1	To control counter/card unit

E. List of VRs, LEDs, and Checkpins by PCB

The following list includes only the VRs, LEDs, and checkpins used in field servicing.

VRs and checkpins not listed below are used only at the factory. Adjustment and checking of these parts requires special tools and high-precision measuring equipment. Do not touch them during servicing.

Notes:

1. Some LEDs may glow slightly even when they should be OFF due to leakage current through them.
2. VR that may be adjusted in the field...................... ●

   VR that must not be adjusted in the field .... ⊘

1. CPU PCB

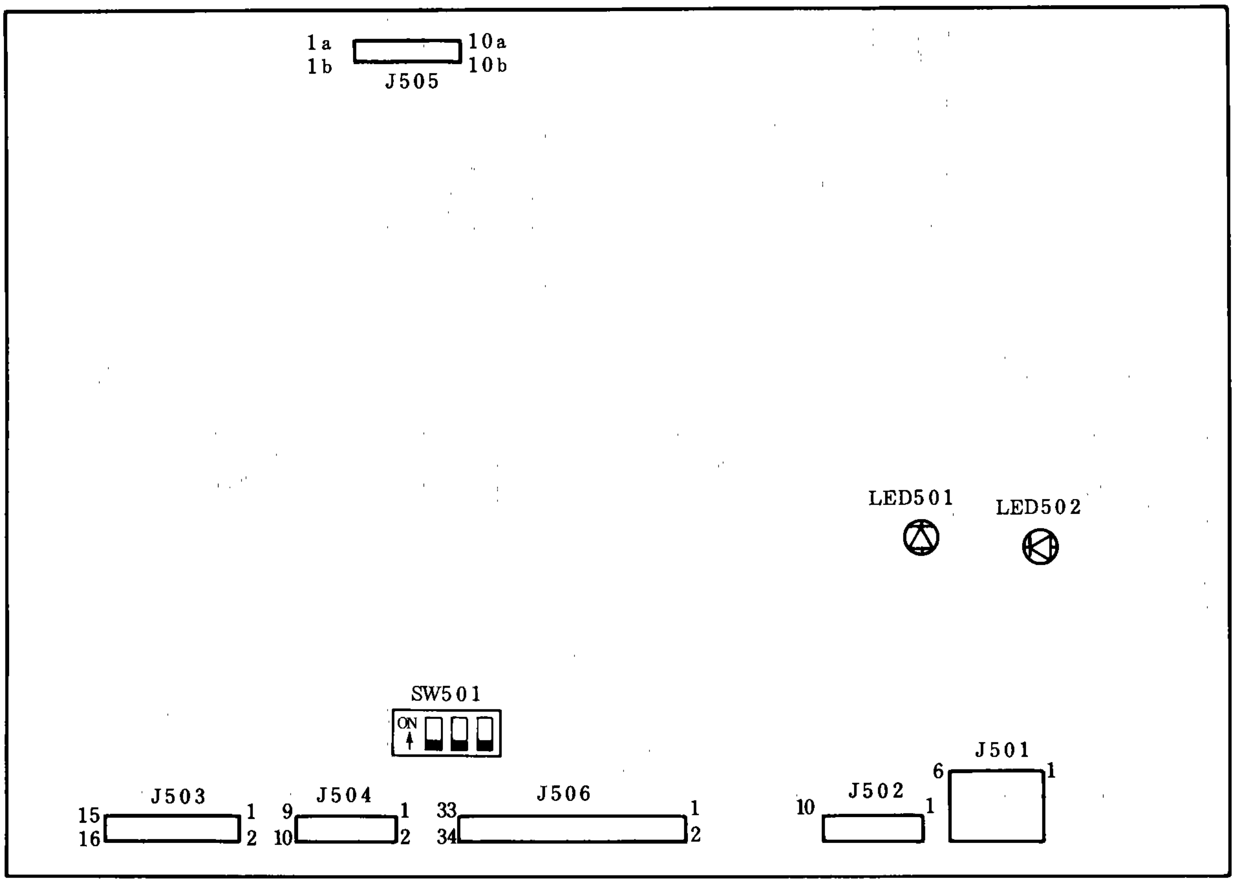

1a
1b
J505
10a
10b
LED501
LED502
SW501
ON
J501
6
1
J503
15
16
1
2
J504
9
10
1
2
J506
33
34
1
2
J502
10
1

Figure 7-13

PCB	LED No.	Indication
CPU PCB	LED501	ON when 24 VDC is being supplied.
	LED502	ON when 5 VDC is being supplied.

Table 7-2

PCB	Switch No.	Indication
CPU PCB	SW501	For factory use (normally OFF)

Table 7-2a

2. Scanner motor control PCB

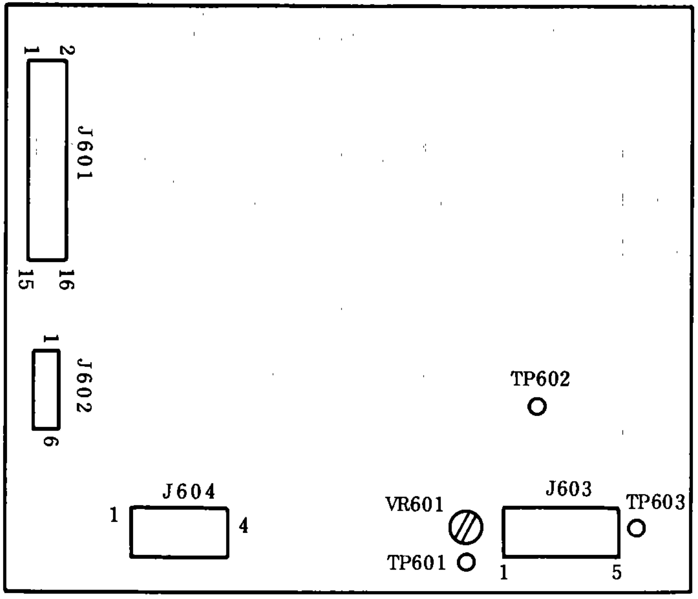

J601
1
2
15
16
J602
1
6
TP602
J604
1
4
VR601
J603
TP603
TP601
1
5

Figure 7-14

3. CCD driver PCB

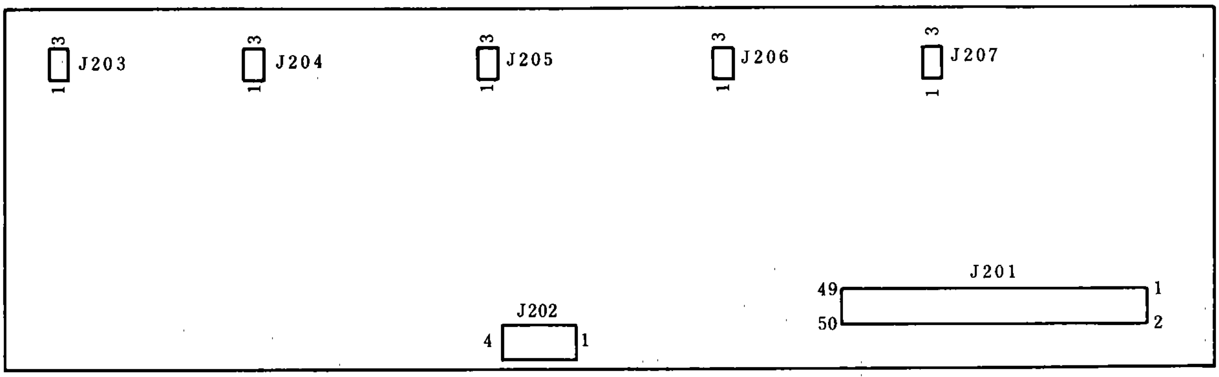
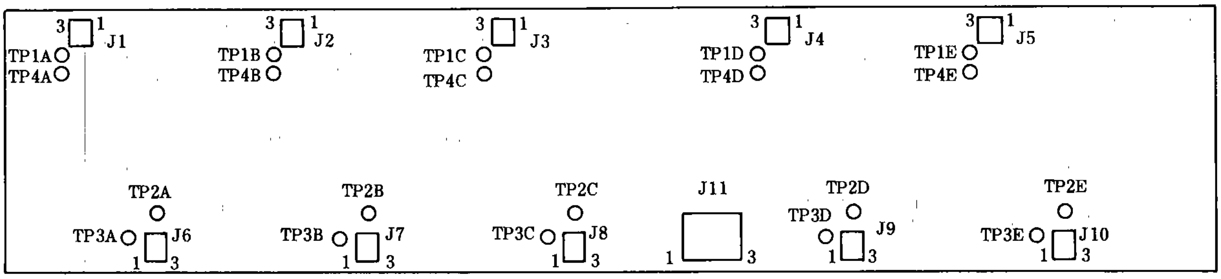

J203
J204
J205
J206
J207
3
1
J201
49
50
1
2
J202
4
1

Figure 7-15

4. CCD pre-amplifier PCB



3
1
J1
TP1A
TP4A
3
1
J2
TP1B
TP4B
3
1
J3
TP1C
TP4C
3
1
J4
TP1D
TP4D
3
1
J5
TP1E
TP4E
TP2A
TP3A
J6
1
3
TP2B
TP3B
J7
1
3
TP2C
TP3C
J8
1
3
J11
1
3
TP2D
TP3D
J9
1
3
TP2E
TP3E
J10
1
3

Figure 7-16

PCB	Check pin No.	Check	Check pin No.	Check
CCD pre-amplifier	TP1A	CH1 input	TP3A	GND
	TP1B	CH2 input	TP3B	GND
	TP1C	CH3 input	TP3C	GND
	TP1D	CH4 input	TP3D	GND
	TP1E	CH5 input	TP3E	GND
	TP2A	CH1 output	TP4A	GND
	TP2B	CH2 output	TP4B	GND
	TP2C	CH3 output	TP4C	GND
	TP2D	CH4 output	TP4D	GND
	TP2E	CH5 output	TP4E	GND

Table 7-3

5. Analog processor PCB

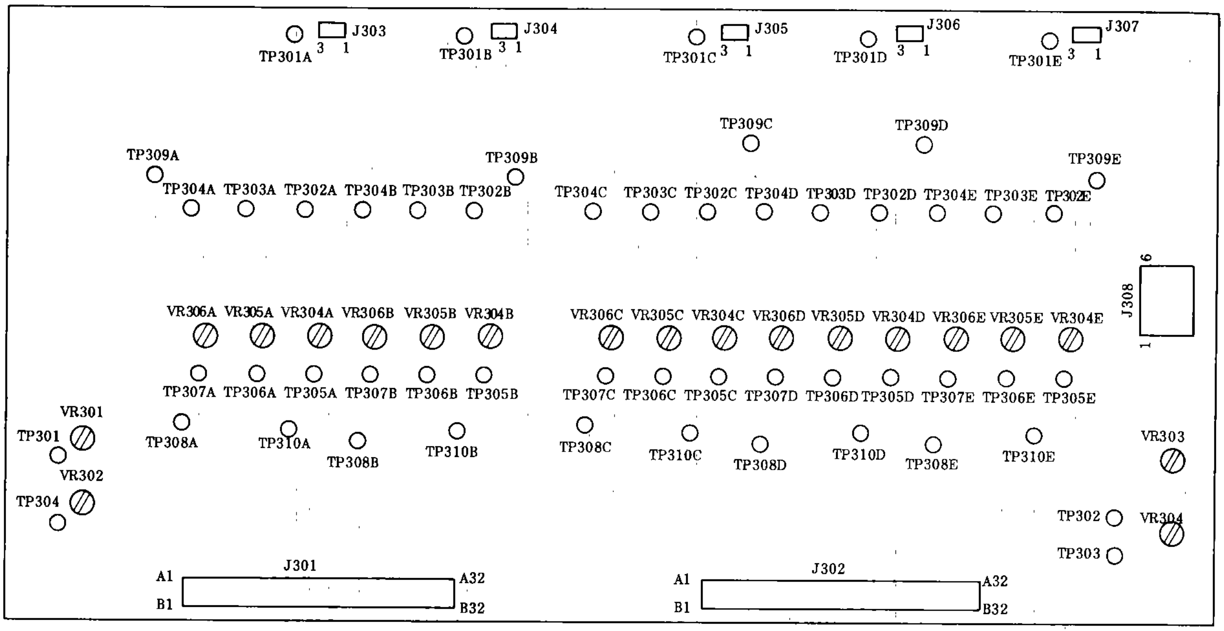

J303
TP301A
3 1
J304
TP301B
3 1
J305
TP301C
3 1
J306
TP301D
3 1
J307
TP301E
3 1
TP309C
TP309D
TP309A
TP309B
TP309E
TP304A TP303A TP302A TP304B TP303B TP302B
TP304C TP303C TP302C TP304D TP303D TP302D TP304E TP303E TP302E
J308
9
8
1
VR306A VR305A VR304A VR306B VR305B VR304B
VR306C VR305C VR304C VR306D VR305D VR304D VR306E VR305E VR304E
TP307A TP306A TP305A TP307B TP306B TP305B
TP307C TP306C TP305C TP307D TP306D TP305D TP307E TP306E TP305E
VR301
TP301
VR302
TP304
TP308A
TP310A
TP308B
TP310B
TP308C
TP310C
TP308D
TP310D
TP308E
TP310E
VR303
TP302
VR304
TP303
J301
A1
B1
A32
B32
J302
A1
B1
A32
B32

Figure 7-17

PCB	Check pin No.	Check	Check pin No.	Check
Analog processor	TP301	2.49V	TP305D	CH4B (after level adjustment)
	TP302	2.49V	TP305E	CH5B (after level adjustment)
	TP303	2.49V	TP306A	CH1G (after level adjustment)
	TP304	2.49V	TP306B	CH2G (after level adjustment)
	TP301A	CH1 input	TP306C	CH3G (after level adjustment)
	TP301B	CH2 input	TP306D	CH4G (after level adjustment)
	TP301C	CH3 input	TP306E	CH5G (after level adjustment)
	TP301D	CH4 input	TP307A	CH1R (after level adjustment)
	TP301E	CH5 input	TP307B	CH2R (after level adjustment)
	TP302A	CH1B	TP307C	CH3R (after level adjustment)
	TP302B	CH2B	TP307D	CH4R (after level adjustment)
	TP302C	CH3B	TP307E	CH5R (after level adjustment)
	TP302D	CH4B	TP308A	CH1 (before A/D conversion)
	TP302E	CH5B	TP308B	CH2 (before A/D conversion)
	TP303A	CH1G	TP308C	CH3 (before A/D conversion)
	TP303B	CH2G	TP308D	CH4 (before A/D conversion)
	TP303C	CH3G	TP308E	CH5 (before A/D conversion)
	TP303D	CH4G	TP309A	GND
	TP303E	CH5G	TP309B	GND
	TP304A	CH1R	TP309C	GND
	TP304B	CH2R	TP309D	GND
	TP304C	CH3R	TP309E	GND
	TP304D	CH4R	TP310A	GND
	TP304E	CH5R	TP310B	GND
	TP305A	CH1B (after level adjustment)	TP310C	GND
	TP305B	CH2B (after level adjustment)	TP310D	GND
	TP305C	CH3B (after level adjustment)	TP310E	GND

Table 7-4

6. Digital processor PCB

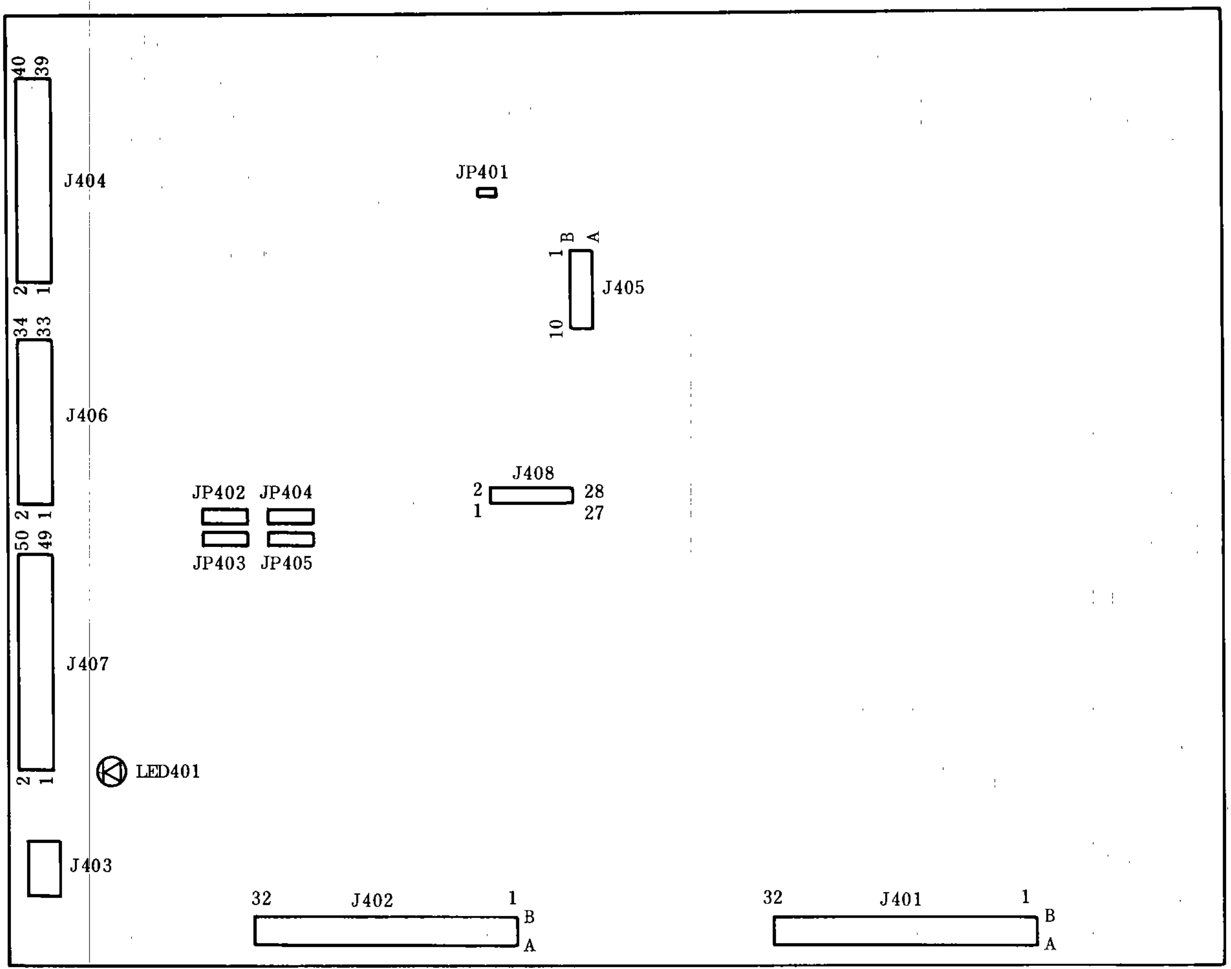

40
39
J404
2
1
34
33
J406
2
1
50
49
2
1
J407
2
1
LED401
J403
JP401
1
B
A
J405
10
J408
2
1
28
27
JP402
JP404
JP403
JP405
32
J402
1
B
A
32
J401
1
B
A

Figure 7-18

PCB	LED No.	Indication
Digital processor	LED401	ON when 5 VDC is being supplied.

Table 7-5

7. Lamp regulator PCB

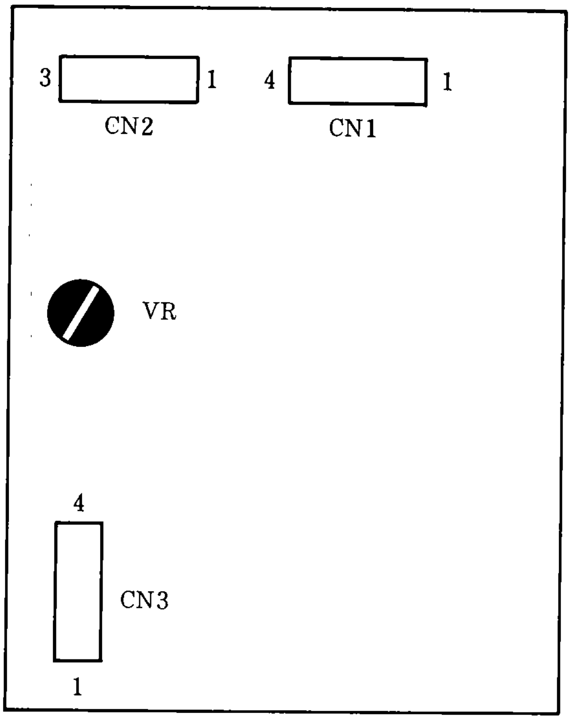

3
1
CN2
4
1
CN1
VR
4
CN3
1

Figure 7-19

PCB	VR No.	Function
Lamp regulator	VR	Refer to "Light intensity adjustment" (Refer to the <LAMP ADJ> service mode.)

Table 7-6

8. Editor controller PCB

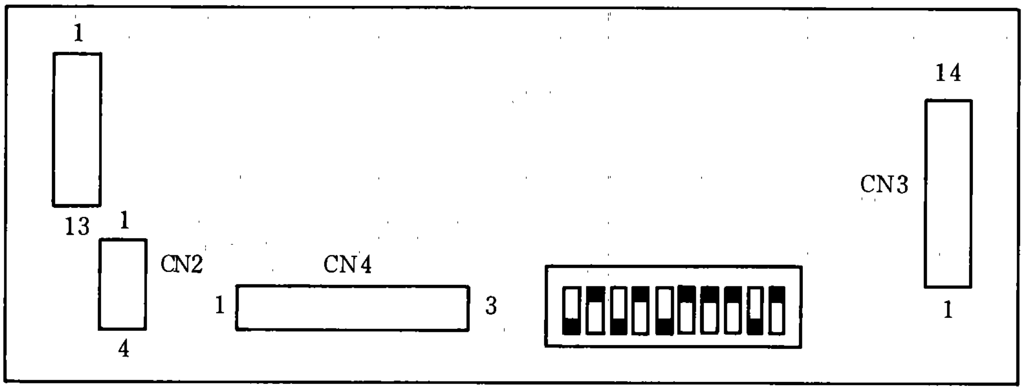

1
13
1
CN2
4
CN4
1
3
14
CN3
1

Figure 7-20

PCB	Switch No.	Function
Editor controller	SW	Changing coordinates (See page 3-30.)

Table 7-7

VI. SERVICE MODE

A. General

The scanner SERVICE mode can be used via the touch panel display on the control panel.

Note:
The printer SERVICE mode cannot be used from the scanner control panel.

B. SERVICE Mode Operation

1. Selecting the SERVICE mode

Note:
The SERVICE mode cannot be selected while copies are being made.

1) Press the ⊠ key on the control panel.
2) Press memory keys [M1] and [M4] at the same time.
3) Press the ⊠ key.

2. Exiting the SERVICE mode
1) Return to the <SERVICE> display shown in Figure 7-21.
2) Press the (U) key.

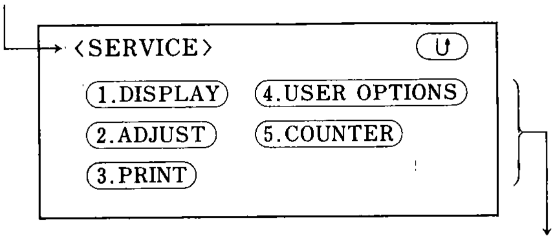
Note:
the (U) key has no effect during printing in the PRINT mode.

3. Using the SERVICE mode

The following example shows how to select and use the SERVICE mode (changing input coordinates editor).

1) Select the SERVICE mode.
   - The <SERVICE> screen shown in Figure 7-21 will be displayed.
2) Press (2. ADJUST).
   - The <ADJUST> screen shown in Figure 7-22 will be displayed.
3) Press (2. EDIT ADJ).
   - The <EDIT ADJ> screen shown in Figure 7-23 will be displayed.
4) Press (⇩) or (⇧) to adjust the input coordinates of the editor.
5) Press (U) to return to the <ADJUST> screen.
6) Press (U) to return to the <SERVICE> screen.
7) Press (U) to exit the SERVICE mode.

Indicates the SERVICE mode.

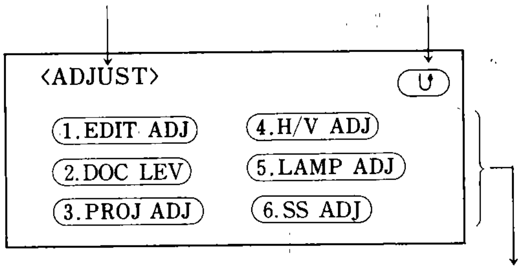


Pressing one of these keys displays the corresponding second-level menu screen.

Figure 7-21 First-level menu

Indicates the ADJUST mode.

Press to return to the first-level menu (screen 1)

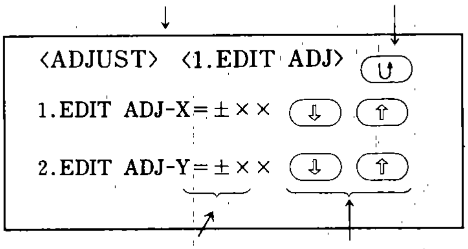


Pressing one of these keys displays the corresponding third-level menu screen.

Figure 7-22 Second-level menu

Indicates EDIT ADJ of the ADJUST mode.

Press to return to the second-level menu (screen 2)



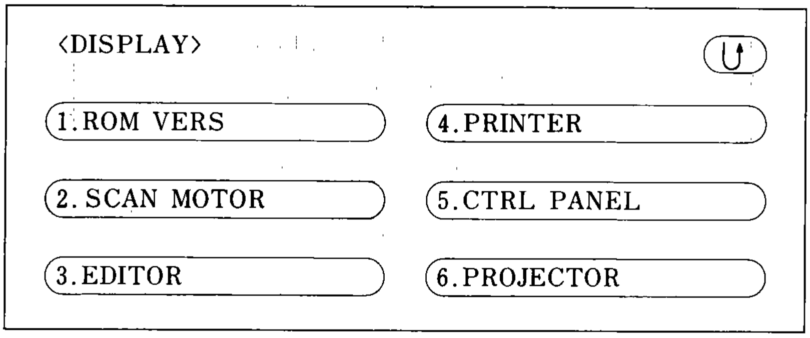
Displays the values changed by (⇩) or (⇧)

Press to change the setting.

Figure 7-23 EDIT ADJ screen

Note:
When the setting is changed in the <ADJUST> mode, write down the new values on the label shown in Figure 7-5.

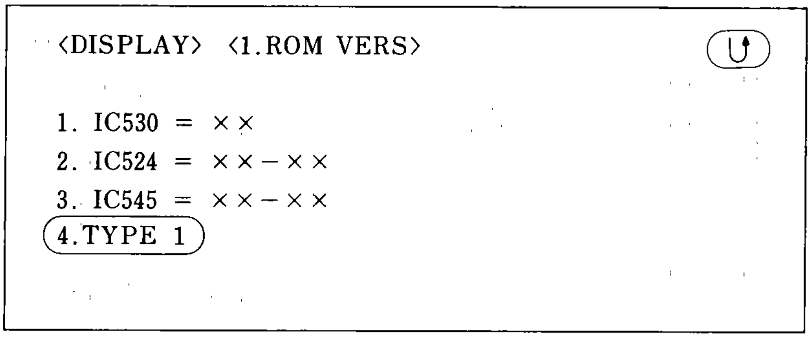
C. Display Mode



<DISPLAY>
1.ROM VERS
2.SCAN MOTOR
3.EDITOR
4.PRINTER
5.CTRL PANEL
6.PROJECTOR

Screen 1. Display mode (Second-level menu)

1. ROM version display



<DISPLAY> <1.ROM VERS>
4.TYPE 1

1. IC530 = ××
2. IC524 = ××−××
3. IC545 = ××−××

Screen 1-1 ROM version display

No.	Indication	Use
1	IC530	Indicates the version of ROM IC530 on CPU PCB.
2	IC524	Indicates the version of ROM IC524 on CPU PCB.
3	IC545	Indicates the version of ROM IC545 on CPU PCB.
4	(TYPE 1)	Press this indication to reverse the indication as shown below: New DS unit——TYPE 1 Old DS unit——(TYPE 1)

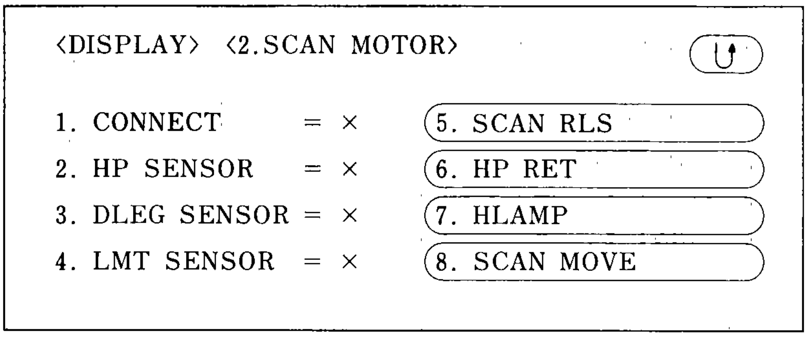
Interpreting the display: ×× − ××

→ Indicates language

→ Indicates version

××-01: Japanese
××-02: English (inch system)
××-03: English (A/B system)
××-04: English (inch & A/B system)
××-05: French
××-06: German
××-07: Spanish

2. Scanner display



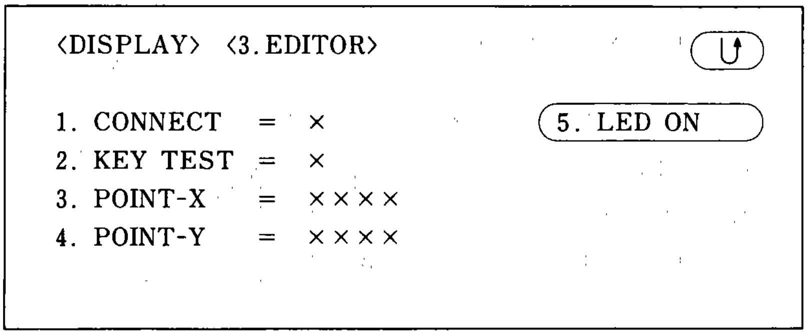
〈DISPLAY〉 〈2.SCAN MOTOR〉

1. CONNECT = ×
2. HP SENSOR = ×
3. DLEG SENSOR = ×
4. LMT SENSOR = ×

Screen 1-2 Scanner display

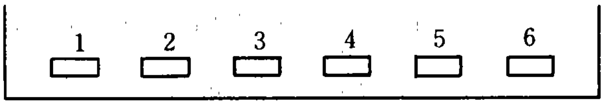
No.	Indication	Use
1	CONNECT	Indicates whether motor driver PCB and CPU PCB are connected. (0: Connected, 1: Not connected)
2	HP SENSOR	Indicates output of scanner home position sensor (PD2). 1: Scanner is at PD2. 0: Scanner is not at PD2.
3	DLEG SENSOR	Indicates output of scanner at leading edge sensor (PD3). 1: Scanner is at PD3. 0: Scanner is not at PD3.
4	LMT SENSOR	Indicates output of scanner left travel limit sensor (PD1) and scanner right travel limit sensor (PD4). 1: Scanner is at either PD1 or PD4. 0: Scanner is at neither PD1 nor PD4.
5	(SCAN RLS)	Press indication to release scanner motor brake. · When the brake is released, scanner can be moved by hand to check 2, 3, and 4 above.
6	(HP RET)	Press indication to return scanner to its home position.
7	(HLAMP)	Press indication to switch scanning lamp ON. Press it again to switch lamp OFF.
8	(SCAN MOVE)	Press indication to advance scanner 30 mm farther from scanner home position sensor. (Key may be pressed successively.)

3. Editor display

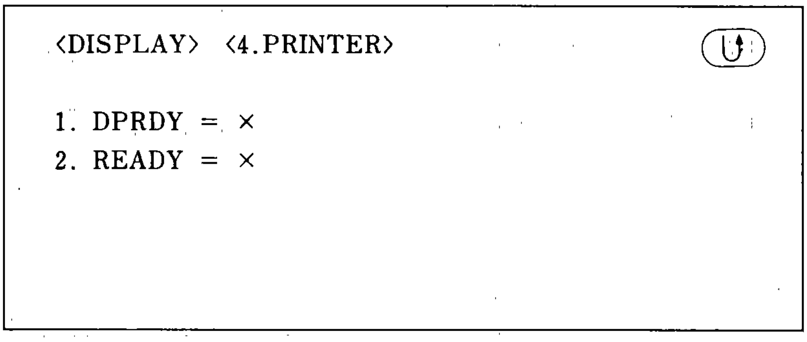


```
<DISPLAY>  <3.EDITOR>

1. CONNECT   =  ×                 5. LED ON
2. KEY TEST  =  ×
3. POINT-X   =  ××××
4. POINT-Y   =  ××××
```

Screen 1-3 Editor display

No.	Indication	Use
1	CONNECT	Indicates whether editor and CPU PCB are connected. 0: Connected 1: Not connected
2	KEY TEST	Display which of the editor operation keys (shown below) has been pressed. 
3	POINT-X	Displays coordinates entered using editor. X direction: POINT-X Y direction: POINT-Y [Unit 1/200 inch = approx. 0.13mm]
4	POINT-Y	
5	LED ON	Press indication to switch all operation LEDs of editor ON. Press it again to switch them OFF.

4. Printer display

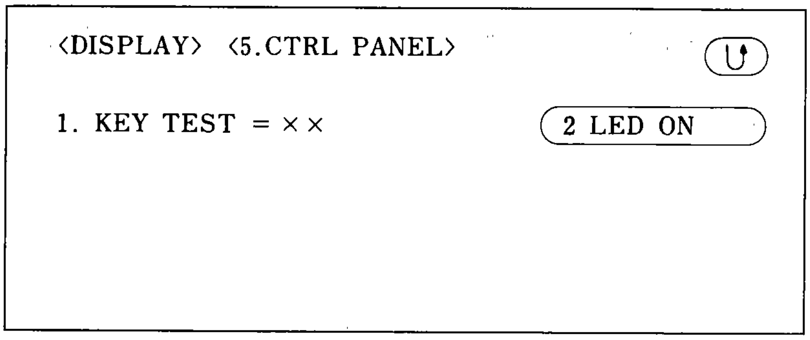


```
<DISPLAY>  <4.PRINTER>

1. DPRDY  =  ×
2. READY  =  ×
```

Screen 1-4 Printer display

No.	Indication	Use
1	DPRDY	0: Scanner is connected to printer, and printer is switched ON. 1: Either scanner is not connected to printer, or printer is not switched ON.
2	READY	Indicates printer readiness. 1: Ready. 0: Not ready.

5. Control panel display



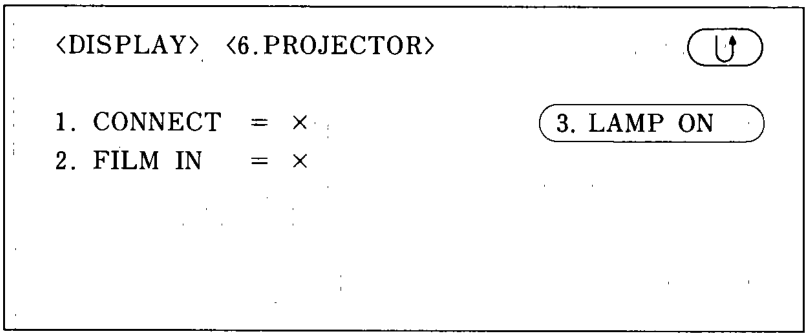
```
<DISPLAY>  <5.CTRL PANEL>

1. KEY TEST  = ××                    ( 2 LED ON )
```

Screen 1-5 Control panel display

No.	Indication	Use
1	KEY TEST	Code number corresponding to key pressed (see table below) will be displayed to confirm contacts.
2	(LED ON)	Press indication to all LEDs of the control panel ON. Press it again to switch them OFF.

Key code	Description	Key code	Description
10	MODE MEMORY key (M1)	24	4
11	MODE MEMORY key (M2)	25	5
12	MODE MEMORY key (M3)	26	6
13	MODE MEMORY key (M4)	27	7
14	DOCUMENT detection key	30	8
15	PROJECTOR key	31	9
16	MEMORY ENTER key	32	ASTERISK key (∗)
17	RECALL key	33	CLEAR/STOP key
20	0	34	–
21	1	35	RESET key (R)
22	2	36	COPY START key
23	3	37	CENTER SHIFT key

6. Projector display

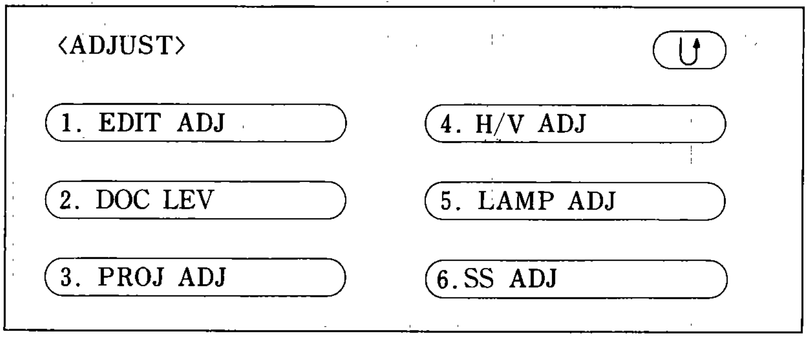


```
<DISPLAY>  <6.PROJECTOR>

1. CONNECT  = ×                    (3. LAMP ON)
2. FILM IN  = ×
```

Screen 1-6 Projector display

No.	Indication	Use
1	CONNECT	Indicates whether scanner and projector are connected. 0: Connected 1: Not connected
2	FILM IN	Indicates whether there is film in projector. 0: Film present. 1: Filn not present.
3	(LAMP ON)	Press indication to switch projector lamp ON. Press it again to switch lamp OFF.

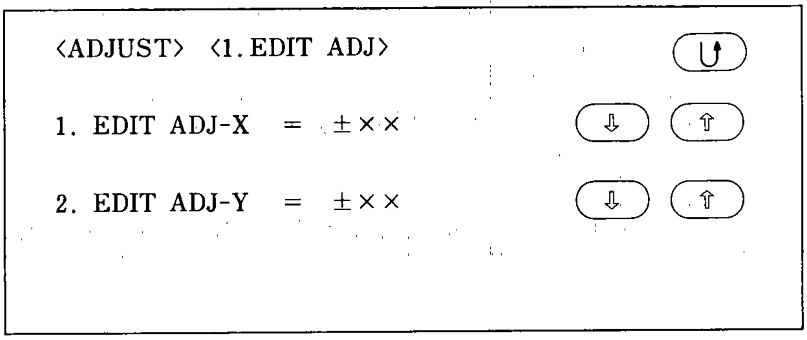
D. Adjustment Mode



<ADJUST>
1. EDIT ADJ
2. DOC LEV
3. PROJ ADJ
4. H/V ADJ
5. LAMP ADJ
6. SS ADJ

Screen 2 Adjustment mode (second-level menu screen)

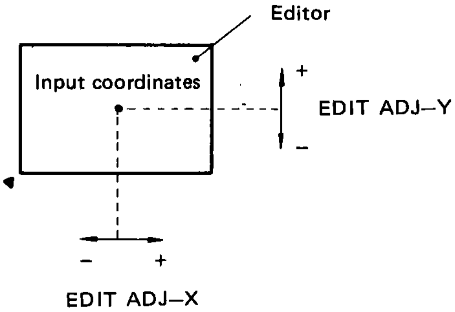
1. Editor adjustment



1. EDIT ADJ-X = ±××

2. EDIT ADJ-Y = ±××

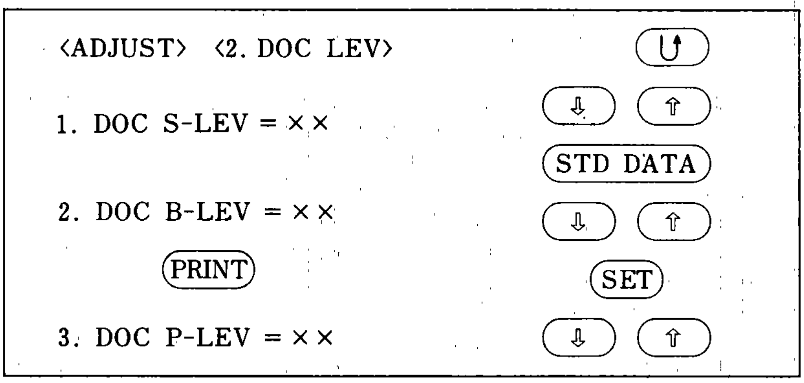
Screen 2-1 Editor adjustment

<table>
<tr><th>No.</th><th>Indication</th><th>Use</th><th>Range of settings</th></tr>
<tr><td>1</td><td>EDIT ADJ-X</td><td rowspan="2">Setting coordinates using editor.
· Standard value is "0".


Editor
Input coordinates
+
EDIT ADJ–Y
–
–
+
EDIT ADJ–X

Note:
After adjustment, write the new values on the label shown in Figure 7-5.</td><td rowspan="2">−99 to +99
(−12.6 to +12.6mm)
1 unit = approx. 0.13 mm</td></tr>
<tr><td>2</td><td>EDIT ADJ-Y</td></tr>
</table>

2. Document recognition sensitivity adjustment/white level adjustment.



<ADJUST> <2. DOC LEV>

1. DOC S-LEV = ××

2. DOC B-LEV = ××

3. DOC P-LEV = ××

Screen 2-2 Document recognition sensitivity adjustment/white level adjustment

No.	Indication	Use	Range of settings
1	DOC S-LEV	For setting document recognition system slice level. Range: 0 (white: density 0) to 31 (black: density 248). **Notes**: 1. Increasing slice level improves ability to sense document but increases risk of incorrect identification. 2. Pressing the (STD DATA) key changes the setting to the reference value. 3. After the adjustment, write the new values on the label shown in Figure 7-5.	0 to 31
2	DOC B-LEV	For adjusting the white level. Adjust the standard value for shading compensation according to the density of the standard white sheet. · Increasing the "DOC B-LEV = × ×" value decreases the standard value for shading compensation, resulting in darker halftone areas. · Decreasing the "DOC B-LEV = × ×" value increases the standard value for shading compensation, resulting in lighter halftone areas.	0 to 99
	(SET)	Press this indication to change the display to SET and to light the scanning lamp. The scanner moves beneath the copy paper and measures the density of the paper. Next, the scanner moves underneath the standard white sheet, measures the density of the sheet, and automatically sets the < DOC B-LEV > value and the < DOC P-LEV > value based on the difference in densities of the copy paper and the standard white sheet. After the adjustment, the display automatically returns to (SET).	
	(PRINT)	Press this indication to start normal copying.	
3	DOC P-LEV	For adjusting the white level (PHOTO and SINGLE-COLOR copying) When copying is made in PHOTO mode as well as in SINGLE-COLOR mode, the standard value for shading compensation is to be adjusted according to the density of the standard white sheet using the "DOC P-LEV = × ×" value. This value should not be altered from the value set by (SET).	0 to 99

Adjusting "DOC B-LEV, DOC P-LEV"

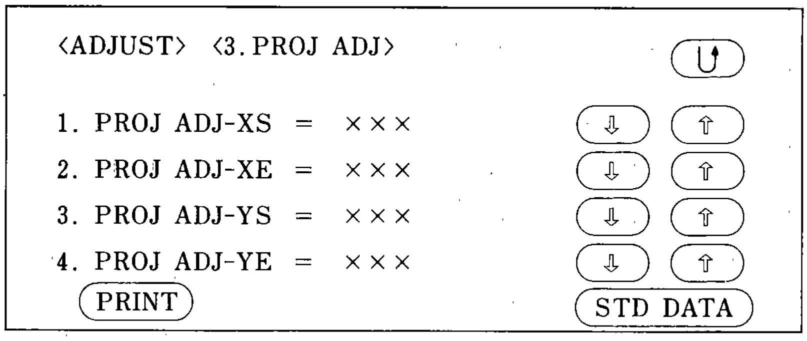
Note 1:
Clean or adjust the following parts before making this adjustment.

- Make 16-gradation test prints in the printer and make sure the printer is not the cause of fogging or poor halftones.
- Clean and check the scanning lamp, reflector, fiber optic lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet).
- Adjust the intensity of the scanning lamp <5. LAMP ADJ>.

1) Reset the "Color Balance Memory" and press the RESET key.
2) Place 10 or more sheets of copy paper on the copyboard glass.
   - Use A3, A4, or Ledger copy paper. Place A4 or Ledger paper in the cross-feed direction. (Use the same type of paper that was used for <LAMP ADJ>.)
3) Enter the SERVICE mode and select <2. DOC LEV>.
4) Press the (SET) indication. (Do not open the editor until the display returns to (SET).)
   - The scanner sets the <DOC B-LEV> value and the <DOC P-LEV> value.
5) Remove the copy papers from the copyboard glass and position the CA-1 test sheet in its place.
6) Press the (PRINT) indication. Check the image for fogging and the density of gray scale No. 8.
   - Go to step 9 if the image is acceptable.
7) When the image is fogged, press the (⇩) indication to decrement "DOC B-LEV = × ×" by about 10.
   When gray scale No. 8 is not visible, press the (⇧) indication to increment "DOC B-LEV = × ×" by about 10.
8) Repeat steps 6 and 7 until the image has no fogging and gray scale No. 8 is barely visible.
9) Write the new value on the label shown in Figure 7-5.

Note 2:
Usually the image will have fogging with the "DOC B-LEV" value set by (SET). To obtain normal image, go to step 7 and decrement "DOC B-LEV" value by about half.
The "DOC P-LEV" value should not be altered from the value set by (SET).

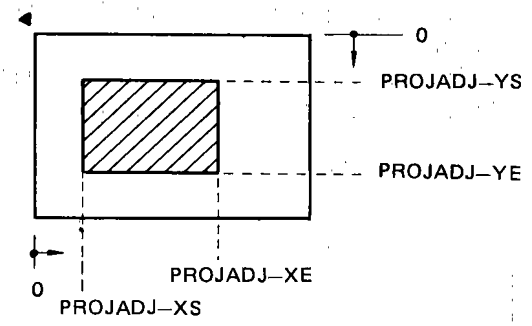
3. Projector adjustment



<ADJUST> <3.PROJ ADJ>

1. PROJ ADJ-XS = ×××
2. PROJ ADJ-XE = ×××
3. PROJ ADJ-YS = ×××
4. PROJ ADJ-YE = ×××

Screen 2-3 Projector adjustment

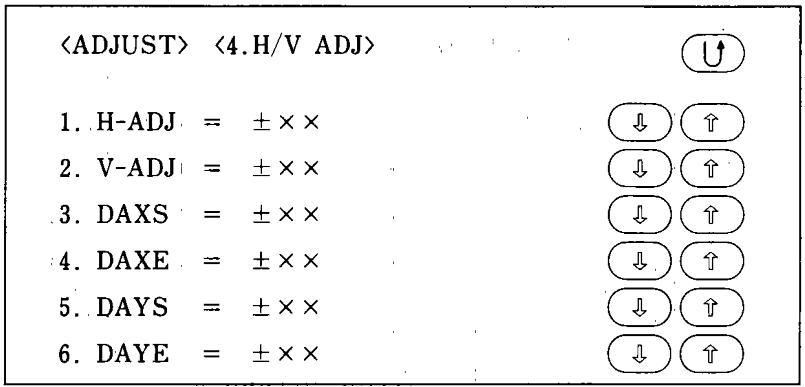
No.	Indication	Use	Range of settings
1	PROJADJ-XS	Setting projector image reading area.  0 PROJADJ–YS PROJADJ–YE PROJADJ–XE 0 PROJADJ–XS Press the (STD DATA) indication to change the four settings to the reference values.	0 to 420
2	PROJADJ-XE		0 to 420
3	PROJADJ-YS		0 to 297
4	PROJADJ-YE		0 to 297 Unit = 1 mm
	(PRINT)	Press this indication to make a copy using the setting in effect before the service mode was entered.	

Adjustment procedure

Before this adjustment, check that the optical axis of the projector is set correctly, then make adjustments not to appear the shadows of the "slide carrier" or "mount of film" on the copy.

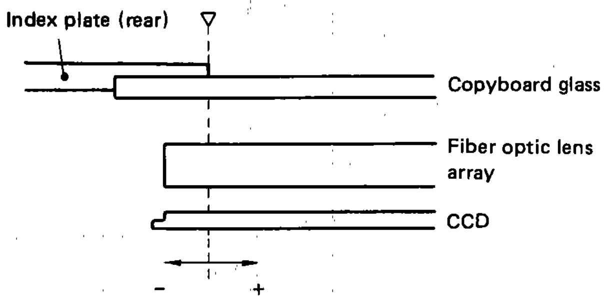
1) Set the "slide magazine" and an empty "slide carrier" in the projector.
2) Select the POSITIVE projector mode, perform shading, focus the lens of the projector on the slide carrier, then press (FIX).
3) Select DIRECT copying, A4 or Letter, not AE mode and SINGLE-COLOR copying.
4) Enter the SERVICE mode and select <3. PROJ ADJ>.
5) Press (PRINT). If the shadow cast by the slide carrier is visible on the copy, adjust the reading area for the projector image as shown above.
6) Reset the slide carrier and do step 5 again. Repeat this five or six times.
7) Remove the magazine from the projector and mount the "slide changer" and the "base film".
8) Press (PRINT). If the shadow cast by the mount of base film is visible on the copy, adjust the reading area for the projector image.
9) Reset the base film and do step 8 again. Repeat this five or six times.
10) Write the new value on the label shown in Figure 7-5.

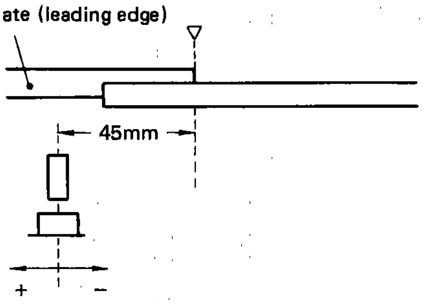
4. Image registration adjustment/document detection area adjustment

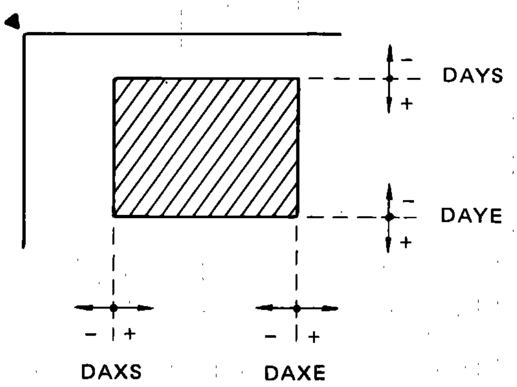
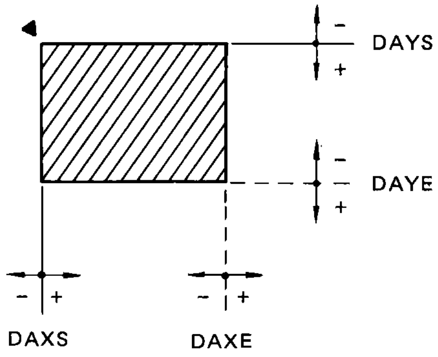

〈ADJUST〉 〈4.H/V ADJ〉 ↺

1. H-ADJ = ±×× ⇩ ⇧
2. V-ADJ = ±×× ⇩ ⇧
3. DAXS = ±×× ⇩ ⇧
4. DAXE = ±×× ⇩ ⇧
5. DAYS = ±×× ⇩ ⇧
6. DAYE = ±×× ⇩ ⇧

Screen 2-4 Image registration adjustment

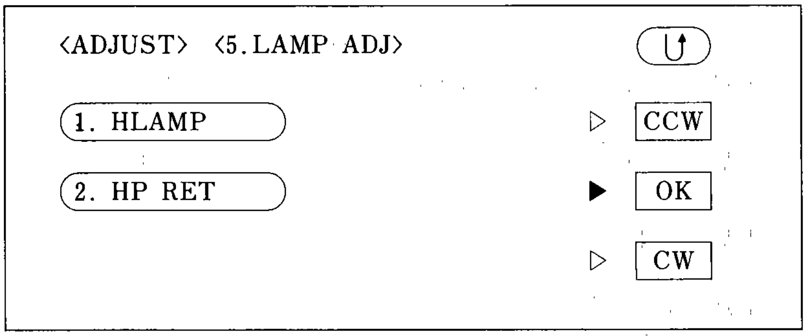
No.	Indication	Use	Range of settings
1	H-ADJ	Adjusting image registration in horizontal (right and left) scanning direction. This adjustment varies the position relative to the edge of the document (index plate) where the CCD begins to read.  Index plate (rear) Copyboard glass Fiber optic lens array CCD - + **Note 1:** This should be adjusted after the DS unit, copyboard glass, etc., has been changed. **Note 2:** The value that has been set is read when the power is switched ON. Make the adjustment, then switch the power OFF, then ON, and check the image. **Note 3:** After making the adjustment, write the new value on the label shown in Figure 7-5.	−31 to +31 (−2 to +2 mm) Unit = approx. 0.06 mm The standard value is 0.

No.	Indication	Use	Range of settings
2	V-ADJ	Adjusting image registration in vertical scanning (leading edge) direction. This adjustment varies the scanner home position.  **Note 1:** This should be adjusted after the copyboard glass, left copyboard glass retainer, etc., has been replaced. **Note 2:** The value that has been set is read when the power is switched ON. Make the adjustment, then switch the power OFF, then ON, and check the image. **Note 3:** After making the adjustment, write the new value on the label shown in Figure 7-5.	−31 to +31 (−3 to +3 mm) Unit = approx. 0.1 mm The standard value is 0.

No.	Indication	Use	Range of settings
3 4 5 6	DAXS DAXE DAYS DAYE	Adjusting of document detection area 1. When document detection mode is ON In the document detection mode, the document should be positioned on the copyboard glass exactly. If it is at an angle, a black frame may appear on the copy around the image. Select settings that prevent frames from appearing on the copy.  2. When document detection mode is OFF When document detection mode is OFF, the document is assumed to be the same size as the selected paper size and area is determined on that the document firmly contacts the left and rear index plates. For fine adjustment of this area, select settings that prevent frames from appearing on the copy.  3. In PROJECTOR mode The above settings are ignored when the PROJECTOR mode is being used, the document detection area is determined by the <3. PROJ ADJ> setting. **Note:** After making the adjustment, write the new value on the label shwon in Figure 7-5.	−63 to +63 (−15.75 to +15.75 mm) Unit = 0.25 mm Reference setting DAXS = +8 DAXE = −8 DAYS = +8 DAYE = −8

5. Lamp intensity adjustment

Clean and check the scanning lamp, reflector, fiber optic lens array and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet) before making this adjustment.



Screen 2-5 Lamp intensity adjustment

No.	Indication	Use
1	(HLAMP)	Press indication to switch the scanning lamp ON and move the scanner underneath the copy paper on the copyboard. (See procedure below.) Press it again to switch the lamp OFF, and return the scanner to its home position.
2	(HP RET)	Press indication to return the scanner to its home position.
3	CCW OK CW	Indicates which way to turn the VR to produce the correct lamp output.

Adjustment procedure

1) Place ten or more sheets of copy paper (see the Note) on the copyboard glass.

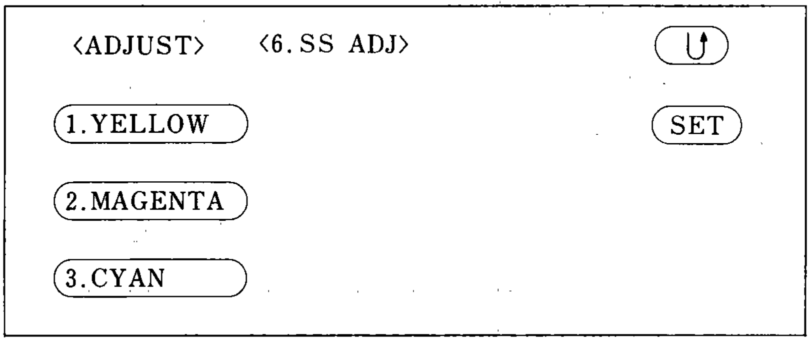
Note:
Use A3, A4, or Ledger copy paper. Place A4 or Ledger paper in the cross feed position.

2) Press (HLAMP).
3) Turn the lamp regulator VR so that the index mark (▶) is beside the "OK" indication.
- If ▶ is beside the "CW" indication, turn th VR clockwise to decrease the light intensity.
- If ▶ is beside the "CCW" indication, turn the VR counterclockwise to increase the light intensity.

4) Press the (HLAMP) indication.

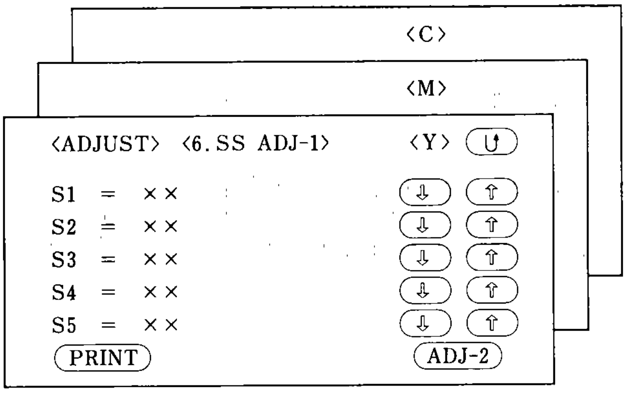
6. Adjustment of differences in density between CCD blocks (channels)
Clean or adjust the following parts before making this adjustment.

- Clean and check the scanning lamp, reflector, fiber optic lens array, and copyboard glass (be careful when cleaning the back surface of the glass facing the standard white sheet).
- Adjust the intensity of the scanning lamp <LAMP ADJ>.
- Adjust the white level <DOC B-LEV>.



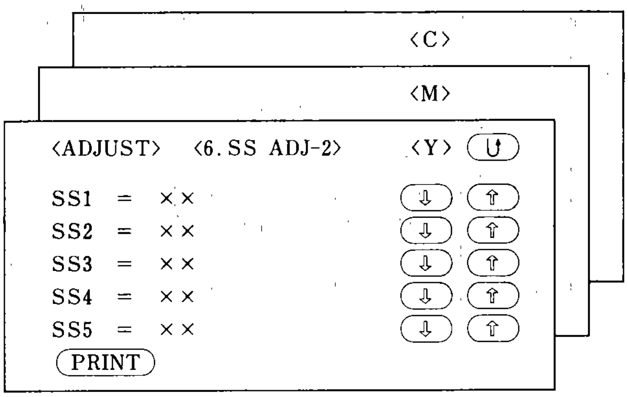
Screen 2-6 Adjustment of differences in density between CCD block outputs (channels) color selection

No.	Indication	Use
1 2 3	(YELLOW) (MAGENTA) (CYAN)	Press any indication to display the adjustment screen for the selected color.
	(SET)	Press this indication to change the display to SET and set the 30 items of data shown on screens 2-6-1 and 2-6-1-1. When all data has been set, the display automatically returns to (SET).


〈ADJUST〉 〈6.SS ADJ-1〉 〈Y〉

S1 = ××
S2 = ××
S3 = ××
S4 = ××
S5 = ××

Screen 2-6-1 ADJ-1


〈ADJUST〉 〈6.SS ADJ-2〉 〈Y〉

SS1 = ××
SS2 = ××
SS3 = ××
SS4 = ××
SS5 = ××

Screen 2-6-1-1 ADJ-2

No.	Indication	Use
1	(PRINT)	Press indication to make copies using only one of the B, G, or R filters. For example, when the <Y> screen appears, copies are made using only the B light component.
2	(ADJ-2)	Press indication to display the ADJ-2 screen.

Adjusting differences in density between CCD blocks

Note 1:
Whether step 4 (SET) should be done is determined by the presence of density differences between CCD blocks.

- Take all steps in the following cases.
  After part replacement
  when differences in density are noticeable beween CCD blocks.
- Do not do step 4 (SET) when adjusting fine differences in density.

1) Select SINGLE-COLOR COPY (Note 2), set DOCUMENT DETECTION mode OFF, and install an A4/LETTER CASSETTE before selecting the SERVICE mode.

Note 2:
Adjustment is easier when <CYAN> or <MAGENTA> is selected for single-color copying.
Note 3:
Select NEGATIVE copying in the normal mode (not the projector mode) when the differences in density appear in NEGATIVE mode using the projector.

2) Place the stepless test chart (FY9-9090) on the copyboard glass with its lighter edge at the left end of the copyboard.
3) Enter the SERVICE mode and select <6. SS ADJ> (Screen 2-6).
4) Press the (SET) indication. (Wait until the indication returns to (SET).
5) Select <YELLOW> (Screen 2-6-1).
6) Press the (PRINT) indication. This makes test copy.
7) If the area on the copy corresponding to CH2 is light, as shown in Figure 7-24, press the (⇧) indication to increment the CH2 setting (S2 = × ×) by one.

■ When NEGATIVE is selected and the area on the copy corresponding to CH4 is light, as shown in Figure 7-24a, press the (⇩) indication to decrement "S4 = × ×" by one.

8) Press the (PRINT) indication again. Check for differences in density in the five areas covered by the different CCD blocks.
9) If the density remains uneven after repeating steps 7 and 8 (Note 4), press the (ADJ-2) indication to display the ADJ-2 screen (Screen 2-6-1-1).

Note 4:
Example — The image is too light when CH2 = 8 and too dark when CH2 = 9.

10) Make the adjustment in the same manner in step 7 and 8.
11) Press the (↶) to return to Screen 2-6.
12) Select <MAGENTA> and make the adjustments in the same manner as in steps 6 through 11.
13) Select <CYAN> and make the adjustments in the same manner as in steps 6 through 11.

Note 5:
The reference value in ADJ-1 screen (Screen 2-6-1) is 08 and that in ADJ-2 screen (Screen 2-6-1-1) is 80.
Note 6:
After making the adjustment, write the adjustment values on the label shown in Figure 7-5.

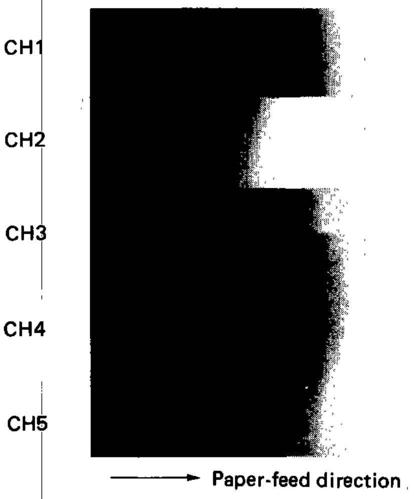


Figure 7-24

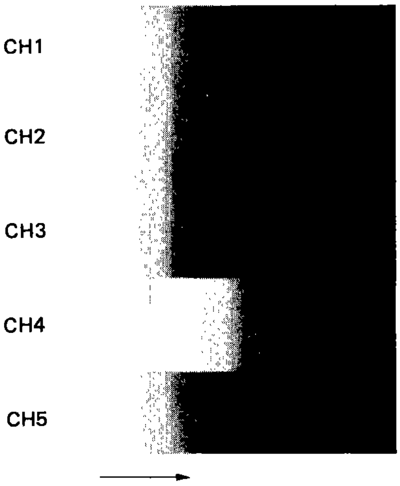
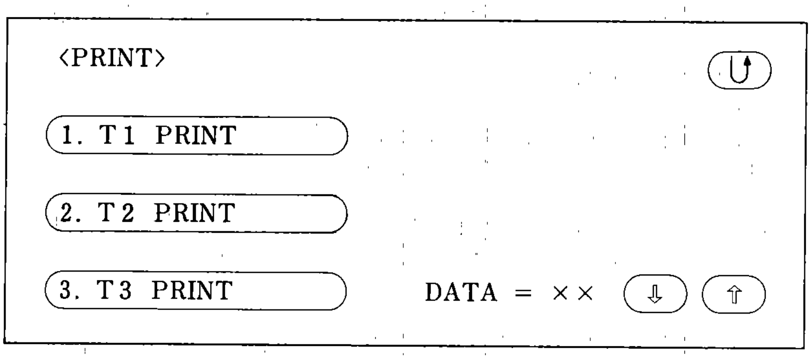
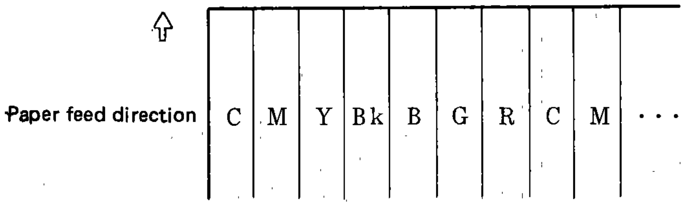
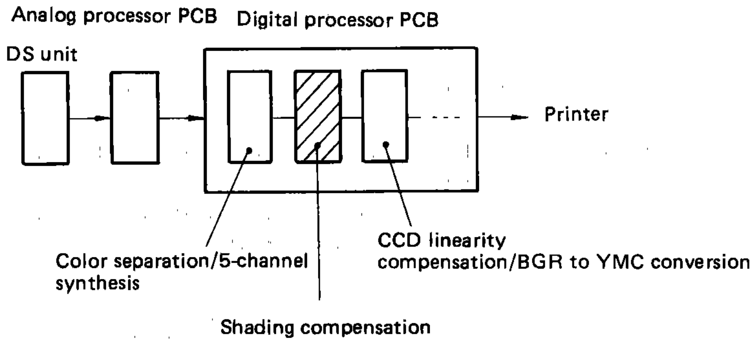
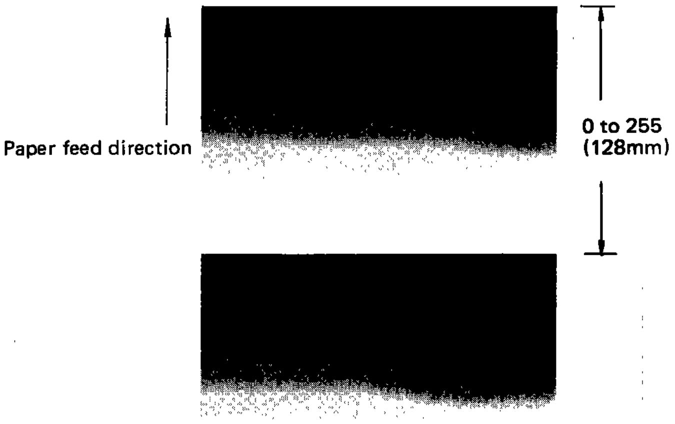


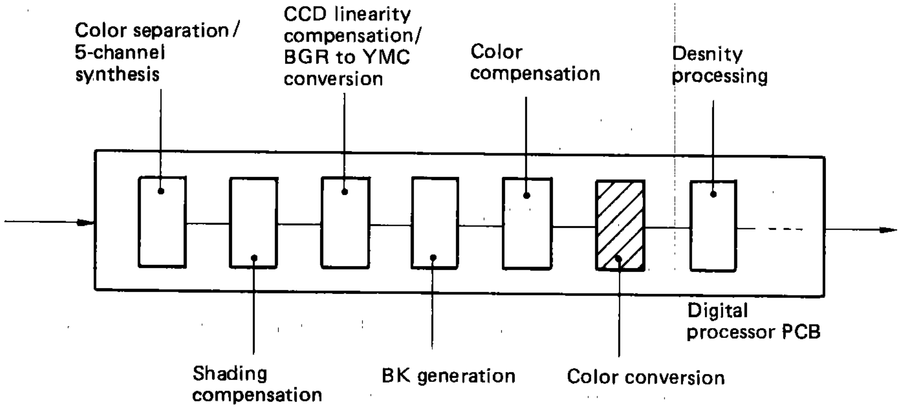
Figure 7-24a When "NEGATIVE" is selected

E. Test Print Mode

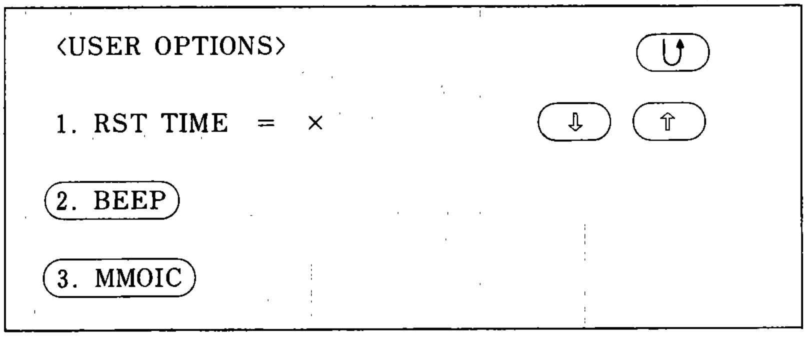

<PRINT>
⤴
1. T1 PRINT
2. T2 PRINT
3. T3 PRINT
DATA = ××
⇩
⇧

Screen 3 Test print

No.	Indication	Use
1	T1 PRINT	Press indication to output the test print of vertical stripes shown below.  Paper feed direction C M Y Bk B G R C M · · · This print data is generated by the shading compensation circuit of the digital processor PCB.  Analog processor PCB Digital processor PCB DS unit Printer Color separation/5-channel synthesis CCD linearity compensation/BGR to YMC conversion Shading compensation
2	T2 PRINT	Press this indication to output the 256-gradation test print shown below.  Paper feed direction 0 to 255 (128mm) The number of lines per gradation is 8 (0.5 mm).

No.	Indication	Use
2	T2 PRINT	Print data are generated by the color conversion circuit of the digital processor PCB.  Color separation/ 5-channel synthesis CCD linearity compensation/ BGR to YMC conversion Color compensation Desnity processing Digital processor PCB Shading compensation BK generation Color conversion When the one-, three-, or four-color mode is set up before starting the SERVICE mode, a 256-gradation test print in the selected color(s) is outputted.
3	T3 PRINT	Press this indication to output an overall halftone test print. The halftone density can be changed by pressing ⇩ and ⇧. As with T1 PRINT, print data are generated by the shading compensation circuit of the digital processor PCB. **Note:** When the one-, three-, or four-color mode is set up before starting the SERVICE mode, a halftone test print in the selected color(s) is outputted.

F. User Option Setting Mode



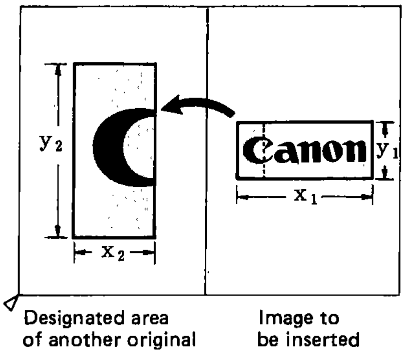
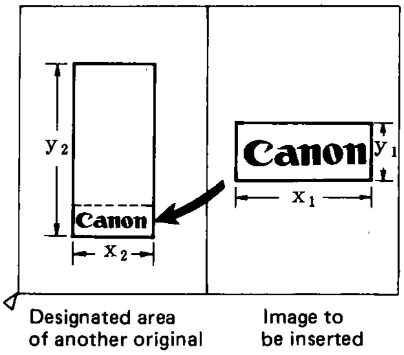
〈USER OPTIONS〉

1. RST TIME = ×

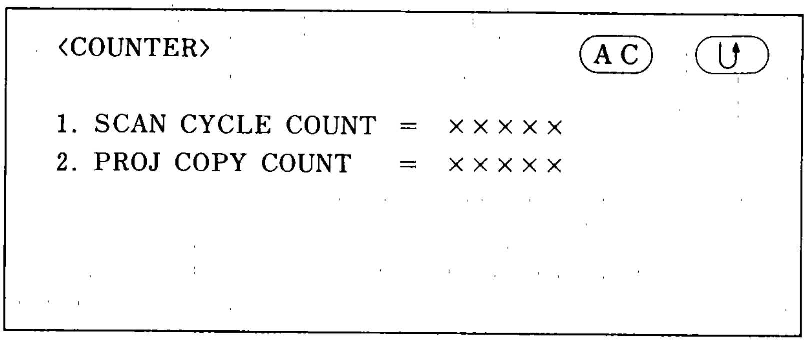
2. BEEP

3. MMOIC

Screen 4 User option setting screen

No.	Indication	Use
1	RST TIME	Press indication to permit resetting time before reverting to STANDARD mode settings Setting range: 0 to 9 Unit: 1 minute Reference value: 2 (0: No automatic reset to the standard mode)
2	BEEP	Cancels the beeper. Press indication to cancel (or restore) beeper.
3	MMOIC	Procedure to specify the same reproduction ratio for both the X and Y directions in producing overlayed image composition. MMOIC Compare the lengths x_1 and y_1 of an original to lengths x_2 and y_2 of a designated area of another original where the image is to be transferred and inserted. The larger size between the two, $\frac{x_2}{x_1}$ and $\frac{y_2}{y_1}$, is specified as the reduction/enlargement ratio in the automatic zoom mode. In the case of illustration to the right, $\frac{y_2}{y_1}$ is specified.  y₂ Canon y₁ x₁ x₂ Designated area of another original Image to be inserted MMOIC The smaller size between the two, $\frac{x_2}{x_1}$ and $\frac{y_2}{y_1}$, is specified as the reduction/enlargement ratio in the automatic zoom mode. In the case of illustration to the right, $\frac{x_2}{x_1}$ is specified.  y₂ Canon Canon y₁ x₁ x₂ Designated area of another original Image to be inserted

G. Counter Mode



<COUNTER>

1. SCAN CYCLE COUNT = ×××××
2. PROJ COPY COUNT = ×××××

Screen 5 Counter

No.	Indication	Use	Counter range
1	SCAN CYCLE COUNT	Display shows total number of scanner operations since last reset. Unit = 100	0 to 65535
2	PROJ COPY COUNT	Display shows total number of copies made using projector since last reset. Unit = 1	0 to 65535
3	AC	Resets the count of the selected setting to 0.	

VII. SELF-DIAGNOSIS

The COLOR LASER COPIER has a self-diagnosis feature based on sensors, the CPU PCB, and the microcomputer of the DC controller PCB. If the self-diagnosis system detects an abnormality, the appropriate error code is displayed on the touch-panel display of the control panel and on the display PCB.

The table below lists the error codes, causes, and timing of tests.

Error code	Major causes	Condition(s) identifying problem
E000	· Thermistor (TH1) open circuit or poor contact. · Broken fixing roller heater (H1, H2). · Defective AC driver PCB. · Defective DC controller PCB. · Defective triac.	· Fixing roller temperature has not reached 50°C within four minutes after power is switched ON. · Fixing roller temperature exceeded 200°C. · Thermistor connector is disconnected.
E005	· Cleaning belt of fixing unit nearly all used. · Defective remaining cleaning belt sensor (Q25). · Defective DC controller PCB.	· The thickness of the fixing unit cleaning belt on the take-up reel exceeds the allowable limit.
E010	· Defective drum motor. · Defective motor driver PCB. · Defective DC controller PCB.	· Clock pulses are not being generated within 0.2 second after the drum motor starts rotating and the first TRANSFER DRUM HOME POSITION SENSOR signal is outputted. · The specified number of clock pulses is not outputted for one rotation of the transfer drum.
E012	· Faulty drum motor. · Defective DC driver PCB. · Defective DC controller PCB.	· The speed of the main motor was not of the specified range for 2 seconds or more.
E020	· Defective toner concentration sensor PCB. · Defective developing unit optical fiber. · Defective lamp (LA1). · Defective display PCB.	· Reading for address L260, L261, L262 or L263 is lower than required. · Reading for address L260, L261, L262, L263 is higher than required. · Reading for addresses L260 and L264, L261 and L265, L262 and L266, or L263 and L267 were indentical four time or more in succession. · Reading for address L260 is less than half that for L244 (likewise for L261/L245, L262/L246, L263/L247). · Toner concentration does not reach the required value even after 20 or more toner-replenishing rotations of the transfer drum. · Reading for address L254 is less than that for L240 (likewise for L255/L241, L256/242, L257/L243) for move than 30 copies in succession.
E021	· Defective turret motor (M4). · Defective turret motor controller PCB. · Defective turret motor driver PCB. · Defective turret motor driver unit. · Defective DC controller PCB.	· Overcurrent detection circuit of the turret motor controller PCB detects an overcurrent. · The TURRET HOME POSITION SENSOR signal is not generated within 20 seconds after the turret returns to its home position. · The turret has not reached a specified new position within 3 seconds after the MOTOR DRIVE command is sent.

Error code	Major causes	Condition(s) identifying problem
E030	· Discontinuity in coil circuit of counter. · Defective DC controller PCB. · Defective DC driver PCB.	· Counter does not operate when it should.
E040	· Defective cassette paper lifter clutch. · Defective DC driver PCB. · Defective DC controller PCB.	· CASSETTE LIFTER POSITION SENSOR signal is not generated within ten seconds after the CASSETTE PAPER LIFTER CLUTCH DRIVE command was outputted.
E061	· Defective drum surface potential measuring unit. · Defective drum surface potential controller PCB. · Defective primary corona unit. · Defective HVT-DC2. · Defective DC controller PCB.	· While the drum potential is being adjusted, the dark area potential (V_D) is identical to the light area potential (V_L). · Grid bias limiter has come into operation. · Developing bias limiter has come into operation. · While the drum potential is being adjusted, the difference between V_D1 and V_D2 is 50V or less.
E070	· Defective drum motor. · Defective motor driver PCB. · Defective transfer drum home position sensor (Q16). · Defective DC controller PCB. · Defective transfer drum.	· The first TRANSFER DRUM HOME POSITION SENSOR signal is not outputted within 6 seconds after the drum motor starts rotating. · While the drum motor is rotating, the TRANSFER DRUM HOME POSITION SENSOR signal is outputted at intervals of 6 seconds or more.
E071	· Defective image leading edge sensor (Q15). · Defective DC controller PCB.	· While the drum motor is rotating, no IMAGE LEADING EDGE SENSOR signal is outputted in the period between two successive TRANSFER DRUM HOME POSITION SENSOR signals.
E100	· Incorrect position of the laser reflection (BD) mirror. · Defective laser unit. · Defective optical fiber. · Defective DC controller PCB.	· The period between successive BD signals differs from the specified value by 2 seconds or more.
E110	· Defective scanning mirror motor. · Defective scanning mirror motor driver PCB. · Defective DC controller PCB.	· Motor does not reach the specified speed within 60 seconds after the power is switched ON.
E120	· Defective laser unit. · Defective DC driver PCB. · Defective DC controller PCB.	· Laser unit has not reached the specified temperature within 60 seconds after the power is switched ON.
E205	· Defective scanner motor. · Defective scanner travel limit sensor (left or right). · Defective scanner motor controller PCB. · Defective CPU PCB. · Defective power supply to the scanner motor controller PCB.	· The scanner is not at its HOME position within 6 seconds after the power is switched ON and the CPU outputs the return to HOME POSITION command. · The scanner travel limit sensor (left or right) detects the scanner at the following times: 1. In STANDBY, 2. When signal ILEGC is received from the printer, 3. After a copying (image making) scanning operation. · There is a communication error between the CPU PCB and the scanner motor controller PCB.

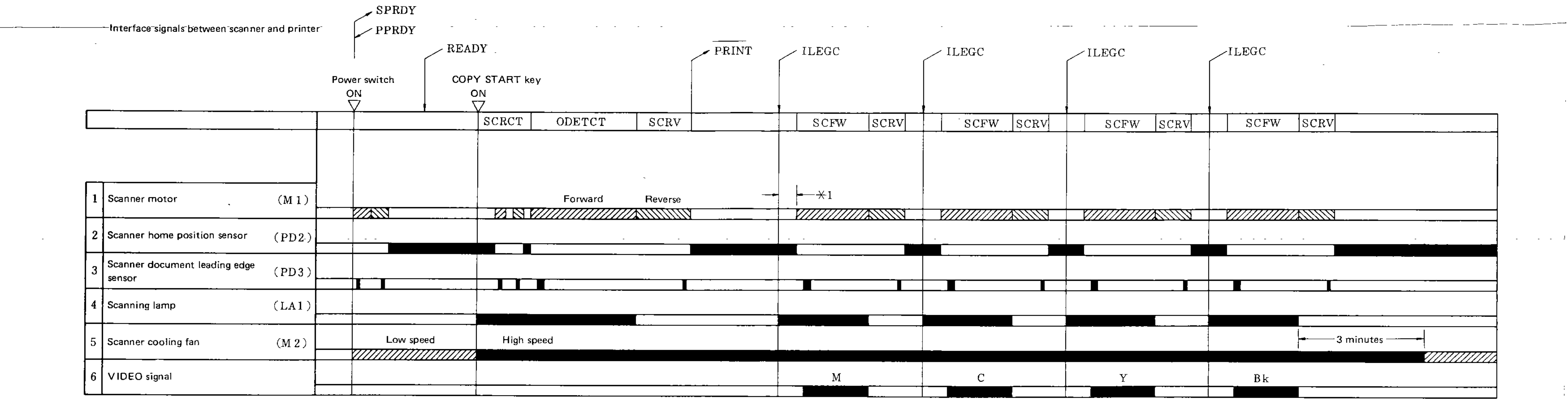
Error code	Major causes	Condition(s) identifying problem
E302	· Defective scanning lamp · Defective standard white sheet · Defective CCD · Defective CCD pre-amplifier PCB · Defective CCD driver PCB · Defective analog processor PCB · Defective digital processor PCB · Defective wiring	· The density level is smaller (darker) than the standard value when measuring the standard white sheet after the COPY START key is pressed. (If SERVICE mode has been selected even once after scanner power is turned ON, E302 will not be detected from that time onward.)
E620	· Defective editor controller PCB. · Defective CPU PCB. · Defective power supply to the editor controller PCB.	· A communication error between the CPU PCB and the editor controller PCB has occurred.
E700	· Defective printer DC controller PCB. · Defective CPU PCB.	· A communication error between the CPU PCB and the DC controller PCB has occurred.

Reference:
When an error is detected by the self-diagnosis system, the machine can be reset by setting the power switch OFF briefly, then ON again, except when E000 is displayed to indicate a broken thermistor. (This prevents the user from damaging the fixing roller by restarting the machine and causing the roller to overheat).

E000 is reset using the printer SERVICE mode, as follows:

1) Set the SERVICE mode and enter ⧆4⧆⧆200⧆ on the printer display PCB.
2) Press 1⧆. (This cancels E000).
3) Press the C key twice.
4) Set the power switch OFF then ON.

A. SCANNER GENERAL TIMING CHART


Interface signals between scanner and printer
SPRDY
PPRDY
READY
PRINT
ILEGC
ILEGC
ILEGC
ILEGC
Power switch ON
COPY START key ON
SCRCT
ODETCT
SCRV
SCFW
SCRV
SCFW
SCRV
SCFW
SCRV
SCFW
SCRV
1 Scanner motor (M1)
Forward
Reverse
*1
2 Scanner home position sensor (PD2)
3 Scanner document leading edge sensor (PD3)
4 Scanning lamp (LA1)
5 Scanner cooling fan (M2)
Low speed
High speed
3 minutes
6 VIDEO signal
M
C
Y
Bk

*1: This time can be changed by the reproduction ratio and the quantity of image shift.

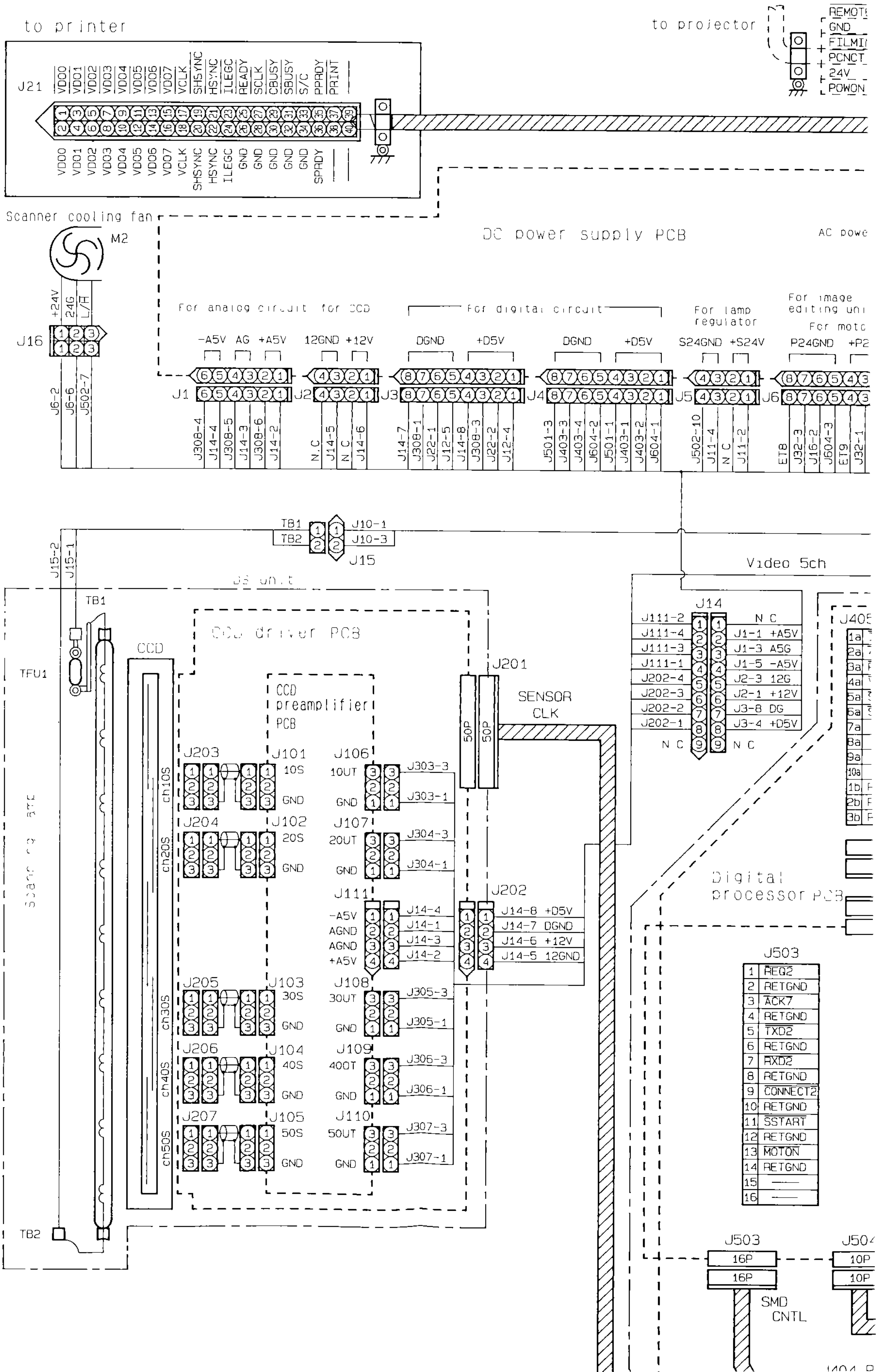
B. LIST OF SIGNALS/COMMANDS IN SCANNER

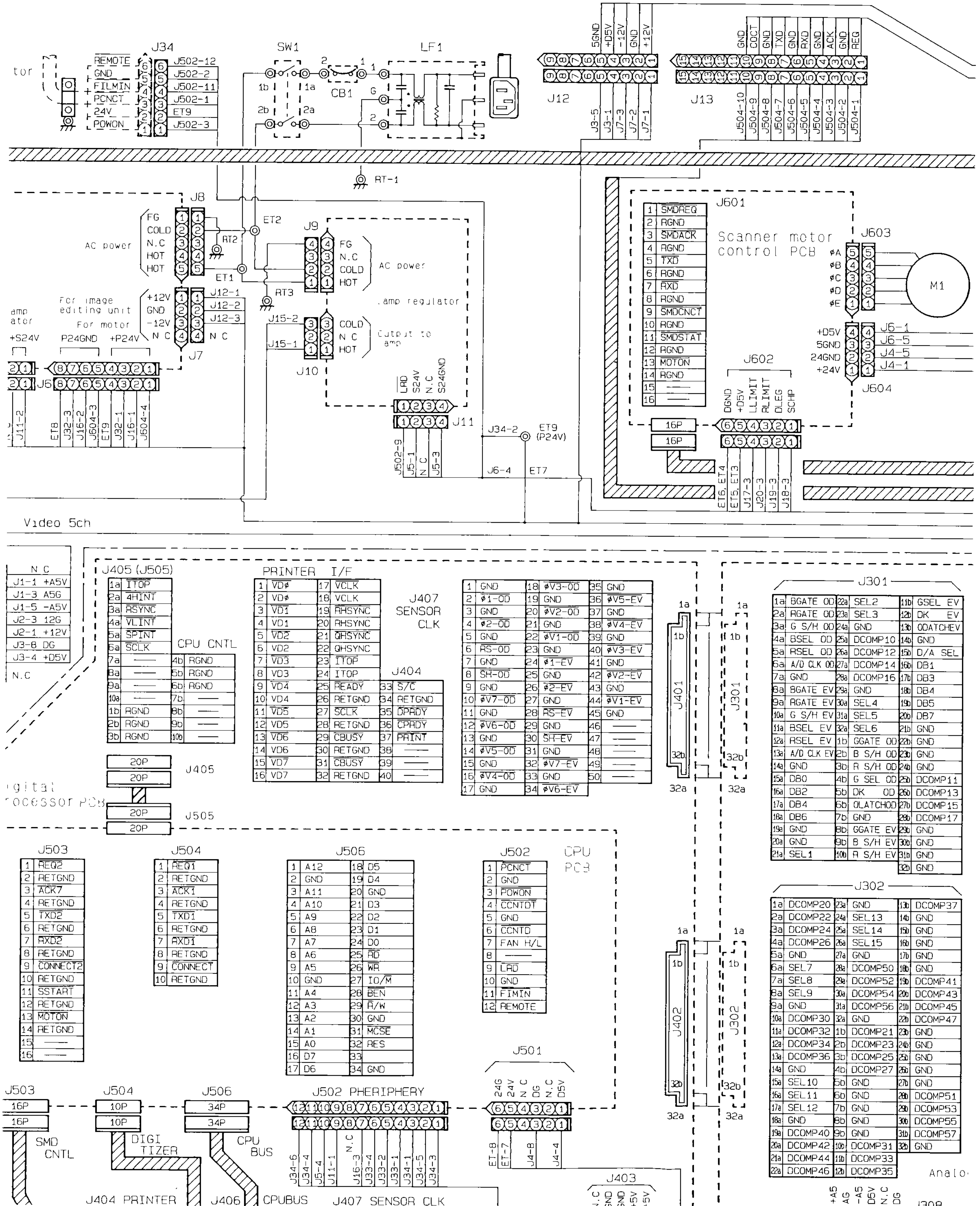
SIGNALS AND COMMANDS

BD	BEAM DETECT signal
CBSY	COMMAND BUSY signal
CCNTD	CONTROL COUNTER DRIVE command
CCNTDT	CONTROL COUNTER DETECT signal
DLEG	DOCUMENT LEADING EDGE signal
FAN H/L	FAN HIGH/LOW SELECT command
FILMIN	FILM IN signal
HSYNC	HORIZONTAL SYNCHRONOUS signal
ILEGC	IMAGE LEADING EDGE CONTROL signal
LLIMIT	SCANNER LEFT LIMIT signal
LRD	LAMP REGULATOR DRIVE command
PCNCT	PROJECTOR CONNECT signal
POWON	PROJECTOR POWER ON command
PPRDY	PRINTER POWER READY signal
PRINT	PRINTER PRINT START command
READY	PRINTER READY signal
REMOTE	PROJECTOR LAMP INTENSITY CONTROL command
RLIMIT	SCANNER RIGHT LIMIT signal
SBSY	STATUS BUSY signal
SC	STATUS/COMMAND signal
SCHP	SCANNER HOME POSITION signal
SCLK	SERIAL CLOCK PULSE signal
SHSYNC	SCANNER HORIZONTAL SYNCHRONOUS signal
SPRDY	SCANNER POWER READY signal
VCLK	VIDEO CLOCK PULSE signal
VDO 7-0	VIDEO signal

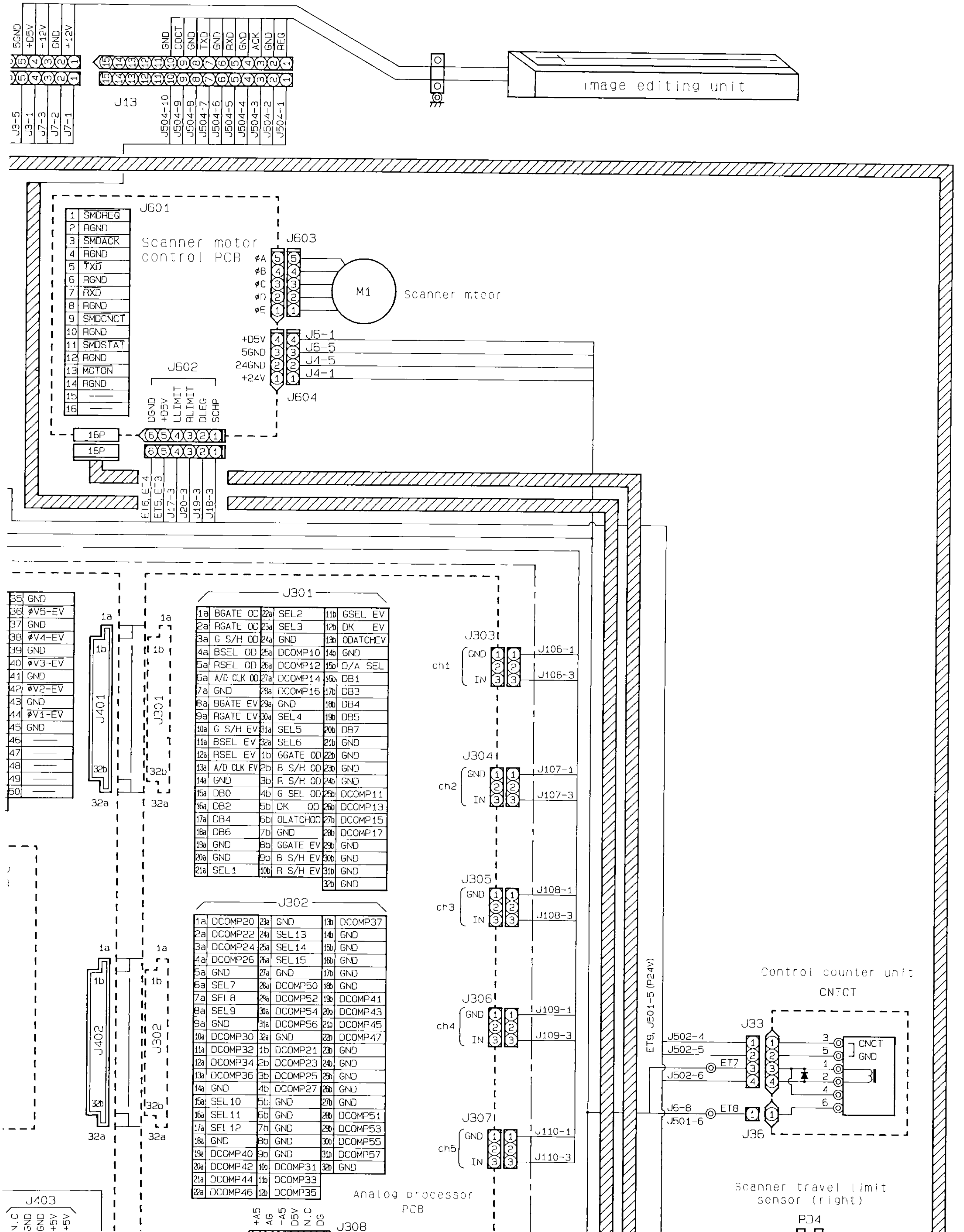
ABBREVIATION

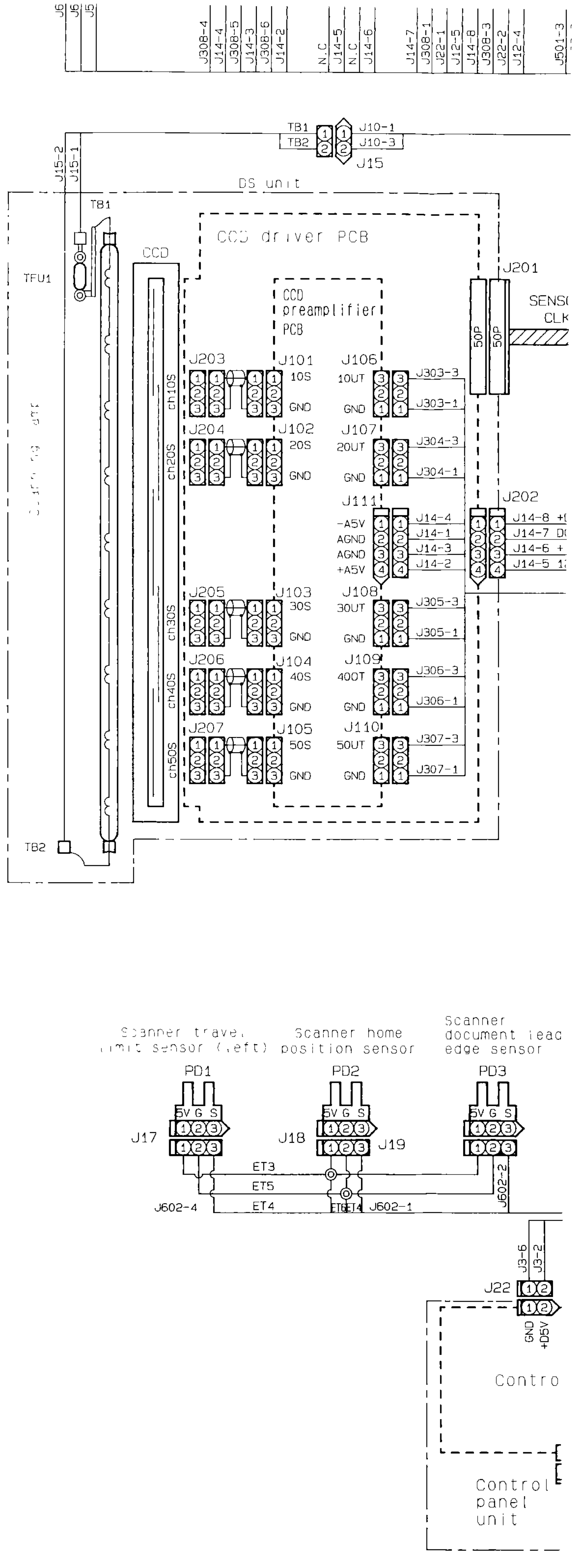
ODETCT	ORIGINAL DETECT stage
SCFW	SCANNER FORWARD stage
SCRCT	SHADING CORRECTION stage
SCRV	SCANNER REVERSE stage

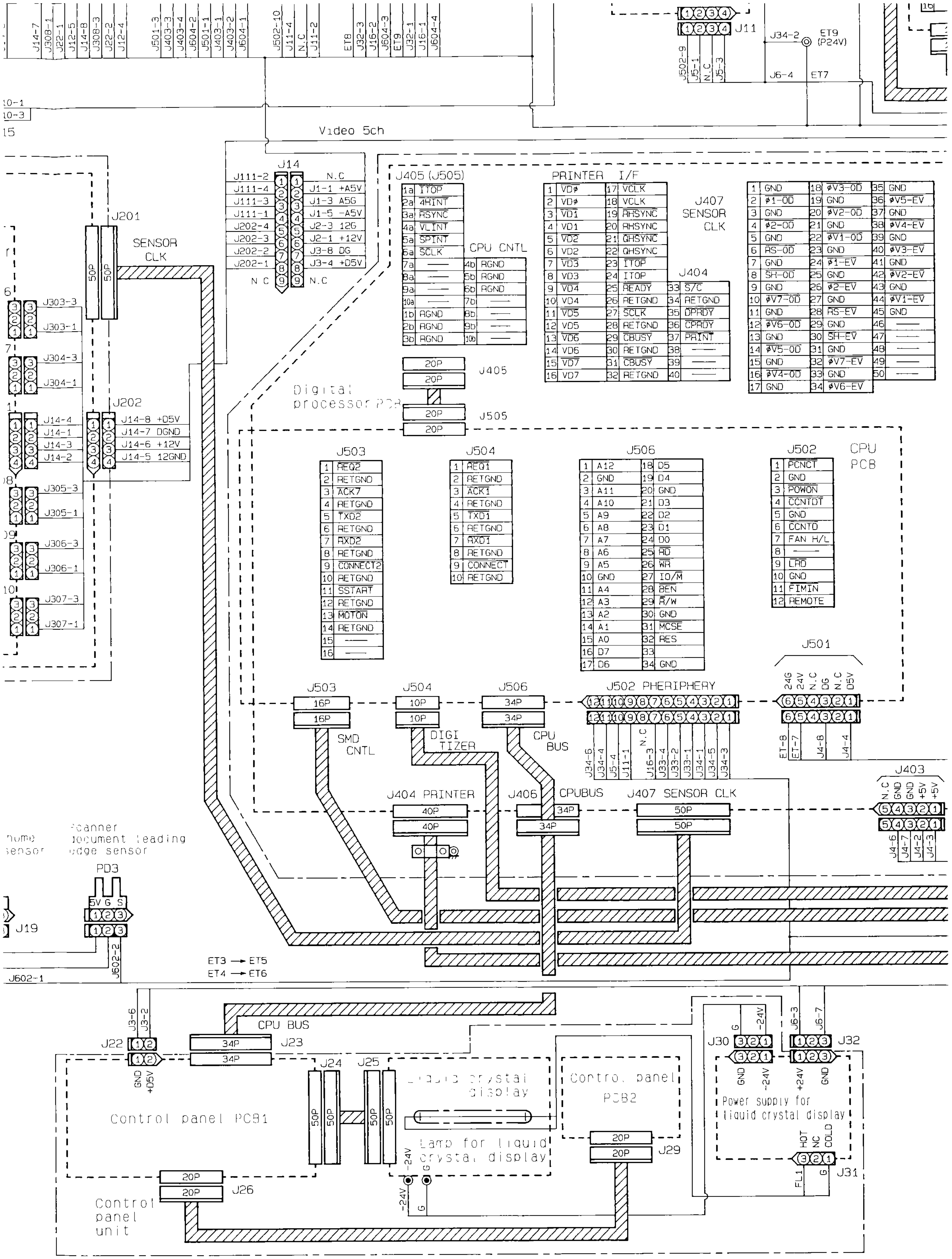

to printer
J21
VDO0
VDO1
VDO2
VDO3
VDO4
VDO5
VDO6
VDO7
VCLK
SHSYNC
HSYNC
ILEGC
READY
SCLK
CBUSY
SBUSY
S/C
PPRDY
PRINT
GND
SPRDY
to projector
REMOTE
GND
FILMI
PCNCT
24V
POWON
Scanner cooling fan
M2
+24V
24G
L/H
J16
J6-2
J6-6
J502-7
DC power supply PCB
AC powe
For analog circuit
for CCD
For digital circuit
For lamp regulator
For image editing uni
For moto
-A5V
AG
+A5V
12GND
+12V
DGND
+D5V
S24GND
+S24V
P24GND
+P2
J1
J2
J3
J4
J5
J6
J308-4
J14-4
J308-5
J14-3
J308-6
J14-2
N.C
J14-5
N.C
J14-6
J14-7
J308-1
J22-1
J12-5
J14-8
J308-3
J22-2
J12-4
J501-3
J403-3
J403-4
J604-2
J501-1
J403-1
J403-2
J604-1
J502-10
J11-4
N.C
J11-2
ET8
J32-3
J16-2
J604-3
ET9
J32-1
TB1
TB2
J10-1
J10-3
J15
J15-2
J15-1
Video 5ch
CS unit
TB1
TFU1
Scanning unit
CCD
CCD driver PCB
CCD preamplifier PCB
J201
SENSOR CLK
50P
J203
J204
J205
J206
J207
J101
J102
J103
J104
J105
J106
J107
J108
J109
J110
J111
ch1OS
ch2OS
ch3OS
ch4OS
ch5OS
1OS
2OS
3OS
4OS
5OS
GND
1OUT
2OUT
3OUT
4OUT
5OUT
J303-3
J303-1
J304-3
J304-1
J305-3
J305-1
J306-3
J306-1
J307-3
J307-1
-A5V
AGND
AGND
+A5V
J14-4
J14-1
J14-3
J14-2
J202
J14-8 +D5V
J14-7 DGND
J14-6 +12V
J14-5 12GND
J14
J111-2
J111-4
J111-3
J111-1
J202-4
J202-3
J202-2
J202-1
N.C
J1-1 +A5V
J1-3 A5G
J1-5 -A5V
J2-3 12G
J2-1 +12V
J3-8 DG
J3-4 +D5V
J405
1a
2a
3a
4a
5a
6a
7a
8a
9a
10a
1b
2b
3b
Digital processor PCB
J503
1 REQ2
2 RETGND
3 ACK7
4 RETGND
5 TXD2
6 RETGND
7 RXD2
8 RETGND
9 CONNECT2
10 RETGND
11 SSTART
12 RETGND
13 MOTON
14 RETGND
15
16
J503
16P
16P
SMD CNTL
J504
10P
10P
J404


tor
J34
REMOTE
GND
FILMIN
PCNCT
24V
POWON
J502-12
J502-2
J502-11
J502-1
ET9
J502-3
SW1
1b
1a
2b
2a
CB1
LF1
G
J12
5GND
+D5V
-12V
GND
+12V
J3-5
J3-1
J7-3
J7-2
J7-1
J13
GND
COCT
GND
TXD
GND
RXD
GND
ACK
GND
REQ
J504-10
J504-9
J504-8
J504-7
J504-6
J504-5
J504-4
J504-3
J504-2
J504-1
RT-1
J8
FG
COLD
N.C
HOT
HOT
AC power
RT2
ET2
ET1
J9
FG
N.C
COLD
HOT
AC power
RT3
Lamp regulator
amp
ator
For image editing unit
For motor
+12V
GND
-12V
N C
J12-1
J12-2
J12-3
N C
J7
+S24V
P24GND
+P24V
J15-2
J15-1
J10
COLD
N C
HOT
Output to amp
LRD
S24V
N.C
S24GND
J11
J34-2
ET9 (P24V)
J502-9
J5-1
N.C
J5-3
J6-4
ET7
J6
J11-2
ET8
J32-3
J16-2
J604-3
ET9
J32-1
J16-1
J604-4
J601
1 SMDREQ
2 RGND
3 SMDACK
4 RGND
5 TXD
6 RGND
7 RXD
8 RGND
9 SMDCNCT
10 RGND
11 SMDSTAT
12 RGND
13 MOTON
14 RGND
15 ——
16 ——
Scanner motor control PCB
J603
φA
φB
φC
φD
φE
M1
+D5V
5GND
24GND
+24V
J604
J6-1
J6-5
J4-5
J4-1
J602
DGND
+D5V
LLIMIT
RLIMIT
DLEG
SCHP
16P
16P
ET6, ET4
ET5, ET3
J17-3
J20-3
J19-3
J18-3
Video 5ch
N.C
J1-1 +A5V
J1-3 A5G
J1-5 -A5V
J2-3 12G
J2-1 +12V
J3-8 DG
J3-4 +D5V
N.C
J405 (J505)
1a ITOP
2a 4HINT
3a RSYNC
4a VLINT
5a SPINT
6a SCLK
7a ——
8a ——
9a ——
10a ——
1b RGND
2b RGND
3b RGND
4b RGND
5b RGND
6b RGND
7b ——
8b ——
9b ——
10b ——
CPU CNTL
PRINTER I/F
1 VDφ | 17 VCLK
2 VDφ | 18 VCLK
3 VD1 | 19 RHSYNC
4 VD1 | 20 RHSYNC
5 VD2 | 21 QHSYNC
6 VD2 | 22 QHSYNC
7 VD3 | 23 ITOP
8 VD3 | 24 ITOP
9 VD4 | 25 READY | 33 S/C
10 VD4 | 26 RETGND | 34 RETGND
11 VD5 | 27 SCLK | 35 DPRDY
12 VD5 | 28 RETGND | 36 CPRDY
13 VD6 | 29 CBUSY | 37 PRINT
14 VD6 | 30 RETGND | 38 ——
15 VD7 | 31 CBUSY | 39 ——
16 VD7 | 32 RETGND | 40 ——
J407 SENSOR CLK
J404
1 GND | 18 φV3-OD | 35 GND
2 φ1-OD | 19 GND | 36 φV5-EV
3 GND | 20 φV2-OD | 37 GND
4 φ2-OD | 21 GND | 38 φV4-EV
5 GND | 22 φV1-OD | 39 GND
6 RS-OD | 23 GND | 40 φV3-EV
7 GND | 24 φ1-EV | 41 GND
8 SH-OD | 25 GND | 42 φV2-EV
9 GND | 26 φ2-EV | 43 GND
10 φV7-OD | 27 GND | 44 φV1-EV
11 GND | 28 RS-EV | 45 GND
12 φV6-OD | 29 GND | 46 ——
13 GND | 30 SH-EV | 47 ——
14 φV5-OD | 31 GND | 48 ——
15 GND | 32 φV7-EV | 49 ——
16 φV4-OD | 33 GND | 50 ——
17 GND | 34 φV6-EV
1a
1b
32b
32a
J401
J301
J301
1a BGATE OD | 22a SEL2 | 11b GSEL EV
2a RGATE OD | 23a SEL3 | 12b DK EV
3a G S/H OD | 24a GND | 13b ODATCHEV
4a BSEL OD | 25a DCOMP10 | 14b GND
5a RSEL OD | 26a DCOMP12 | 15b D/A SEL
6a A/D CLK OD | 27a DCOMP14 | 16b DB1
7a GND | 28a DCOMP16 | 17b DB3
8a BGATE EV | 29a GND | 18b DB4
9a RGATE EV | 30a SEL4 | 19b DB5
10a G S/H EV | 31a SEL5 | 20b DB7
11a BSEL EV | 32a SEL6 | 21b GND
12a RSEL EV | 1b GGATE OD | 22b GND
13a A/D CLK EV | 2b B S/H OD | 23b GND
14a GND | 3b R S/H OD | 24b GND
15a DB0 | 4b G SEL OD | 25b DCOMP11
16a DB2 | 5b DK OD | 26b DCOMP13
17a DB4 | 6b OLATCHOD | 27b DCOMP15
18a DB6 | 7b GND | 28b DCOMP17
19a GND | 8b GGATE EV | 29b GND
20a GND | 9b B S/H EV | 30b GND
21a SEL1 | 10b R S/H EV | 31b GND
32b GND
igital
rocessor PCB
20P
20P
J405
20P
20P
J505
J503
1 REQ2
2 RETGND
3 ACK2
4 RETGND
5 TXD2
6 RETGND
7 RXD2
8 RETGND
9 CONNECT2
10 RETGND
11 SSTART
12 RETGND
13 MOTON
14 RETGND
15 ——
16 ——
J504
1 REQ1
2 RETGND
3 ACK1
4 RETGND
5 TXD1
6 RETGND
7 RXD1
8 RETGND
9 CONNECT1
10 RETGND
J506
1 A12 | 18 D5
2 GND | 19 D4
3 A11 | 20 GND
4 A10 | 21 D3
5 A9 | 22 D2
6 A8 | 23 D1
7 A7 | 24 D0
8 A6 | 25 RD
9 A5 | 26 WR
10 GND | 27 IO/M
11 A4 | 28 BEN
12 A3 | 29 R/W
13 A2 | 30 GND
14 A1 | 31 MCSE
15 A0 | 32 RES
16 D7 | 33
17 D6 | 34 GND
J502
1 PCNCT
2 GND
3 POWON
4 CCNTDT
5 GND
6 CCNTD
7 FAN H/L
8 ——
9 LRD
10 GND
11 FIMIN
12 REMOTE
CPU PCB
J302
1a DCOMP20 | 23a GND | 13b DCOMP37
2a DCOMP22 | 24a SEL13 | 14b GND
3a DCOMP24 | 25a SEL14 | 15b GND
4a DCOMP26 | 26a SEL15 | 16b GND
5a GND | 27a GND | 17b GND
6a SEL7 | 28a DCOMP50 | 18b GND
7a SEL8 | 29a DCOMP52 | 19b DCOMP41
8a SEL9 | 30a DCOMP54 | 20b DCOMP43
9a GND | 31a DCOMP56 | 21b DCOMP45
10a DCOMP30 | 32a GND | 22b DCOMP47
11a DCOMP32 | 1b DCOMP21 | 23b GND
12a DCOMP34 | 2b DCOMP23 | 24b GND
13a DCOMP36 | 3b DCOMP25 | 25b GND
14a GND | 4b DCOMP27 | 26b GND
15a SEL10 | 5b GND | 27b GND
16a SEL11 | 6b GND | 28b DCOMP51
17a SEL12 | 7b GND | 29b DCOMP53
18a GND | 8b GND | 30b DCOMP55
19a DCOMP40 | 9b GND | 31b DCOMP57
20a DCOMP42 | 10b DCOMP31 | 32b GND
21a DCOMP44 | 11b DCOMP33
22a DCOMP46 | 12b DCOMP35
1a
1b
32b
32a
J402
J302
J501
24G
24V
N C
DG
N.C
D5V
J503
16P
16P
J504
10P
10P
J506
34P
34P
J502 PHERIPHERY
SMD CNTL
DIGI TIZER
CPU BUS
J34-6
J34-4
J5-4
J11-1
N.C
J16-3
J33-4
J33-2
J33-1
J34-1
J34-5
J34-3
ET-8
ET-7
J4-8
J4-4
J403
N.C
GND
GND
+5V
+5V
J404 PRINTER
J406
CPUBUS
J407 SENSOR CLK
Analo
+A5
AG
-A5
D5V
N.C
DG
J308

C. SCANNER GENERAL CIRCUIT DIAGRA


5GND
+D5V
-12V
GND
+12V
J3-5
J3-1
J7-3
J7-2
J7-1
GND
COCT
GND
TXD
GND
RXD
GND
ACK
GND
REG
J13
J504-10
J504-9
J504-8
J504-7
J504-6
J504-5
J504-4
J504-3
J504-2
J504-1
image editing unit
J601
1 SMDREG
2 RGND
3 SMDACK
4 RGND
5 TXD
6 RGND
7 RXD
8 RGND
9 SMDCNCT
10 RGND
11 SMDSTAT
12 RGND
13 MOTON
14 RGND
15 ——
16 ——
Scanner motor control PCB
J603
φA
φB
φC
φD
φE
M1
Scanner motor
+D5V
5GND
24GND
+24V
J6-1
J6-5
J4-5
J4-1
J604
J602
DGND
+D5V
LLIMIT
RLIMIT
DLEG
SCHP
16P
16P
ET6, ET4
ET5, ET3
J17-3
J20-3
J19-3
J18-3
35 GND
36 φV5-EV
37 GND
38 φV4-EV
39 GND
40 φV3-EV
41 GND
42 φV2-EV
43 GND
44 φV1-EV
45 GND
46 ——
47 ——
48 ——
49 ——
50 ——
1a
1b
J401
32b
32a
J301
J301
1a BGATE OD
2a RGATE OD
3a G S/H OD
4a BSEL OD
5a RSEL OD
6a A/D CLK OD
7a GND
8a BGATE EV
9a RGATE EV
10a G S/H EV
11a BSEL EV
12a RSEL EV
13a A/D CLK EV
14a GND
15a DB0
16a DB2
17a DB4
18a DB6
19a GND
20a GND
21a SEL1
22a SEL2
23a SEL3
24a GND
25a DCOMP10
26a DCOMP12
27a DCOMP14
28a DCOMP16
29a GND
30a SEL4
31a SEL5
32a SEL6
1b GGATE OD
2b B S/H OD
3b R S/H OD
4b G SEL OD
5b DK OD
6b OLATCHOD
7b GND
8b GGATE EV
9b B S/H EV
10b R S/H EV
11b GSEL EV
12b DK EV
13b ODATCHEV
14b GND
15b D/A SEL
16b DB1
17b DB3
18b DB4
19b DB5
20b DB7
21b GND
22b GND
23b GND
24b GND
25b DCOMP11
26b DCOMP13
27b DCOMP15
28b DCOMP17
29b GND
30b GND
31b GND
32b GND
J302
1a DCOMP20
2a DCOMP22
3a DCOMP24
4a DCOMP26
5a GND
6a SEL7
7a SEL8
8a SEL9
9a GND
10a DCOMP30
11a DCOMP32
12a DCOMP34
13a DCOMP36
14a GND
15a SEL10
16a SEL11
17a SEL12
18a GND
19a DCOMP40
20a DCOMP42
21a DCOMP44
22a DCOMP46
23a GND
24a SEL13
25a SEL14
26a SEL15
27a GND
28a DCOMP50
29a DCOMP52
30a DCOMP54
31a DCOMP56
32a GND
1b DCOMP21
2b DCOMP23
3b DCOMP25
4b DCOMP27
5b GND
6b GND
7b GND
8b GND
9b GND
10b DCOMP31
11b DCOMP33
12b DCOMP35
13b DCOMP37
14b GND
15b GND
16b GND
17b GND
18b GND
19b DCOMP41
20b DCOMP43
21b DCOMP45
22b DCOMP47
23b GND
24b GND
25b GND
26b GND
27b GND
28b DCOMP51
29b DCOMP53
30b DCOMP55
31b DCOMP57
32b GND
J402
J302
J403
N.C
GND
GND
+5V
+5V
+A5
AG
-A5
D5V
N.C
DG
J308
Analog processor PCB
J303
ch1
GND
IN
J106-1
J106-3
J304
ch2
J107-1
J107-3
J305
ch3
J108-1
J108-3
J306
ch4
J109-1
J109-3
J307
ch5
J110-1
J110-3
ET9, J501-5 (P24V)
Control counter unit
CNTCT
J33
J502-4
J502-5
J502-6
ET7
J6-8
J501-6
ET8
J36
CNCT
GND
Scanner travel limit sensor (right)
PD4


J6
J6
J5
J308-4
J14-4
J308-5
J14-3
J308-6
J14-2
N.C
J14-5
N.C
J14-6
J14-7
J308-1
J22-1
J12-5
J14-8
J308-3
J22-2
J12-4
J501-3
TB1
TB2
J10-1
J10-3
J15
J15-2
J15-1
DS unit
TB1
TFU1
CCD
CCD driver PCB
CCD preamplifier PCB
J201
SENS
CLK
50P
50P
J203
J101
10S
GND
J106
1OUT
GND
J303-3
J303-1
ch1OS
J204
J102
2OS
GND
J107
2OUT
GND
J304-3
J304-1
ch2OS
J111
-A5V
AGND
AGND
+A5V
J14-4
J14-1
J14-3
J14-2
J202
J14-8 +
J14-7 D
J14-6 +
J14-5 1
J205
J103
3OS
GND
J108
3OUT
GND
J305-3
J305-1
ch3OS
J206
J104
4OS
GND
J109
4OUT
GND
J306-3
J306-1
ch4OS
J207
J105
5OS
GND
J110
5OUT
GND
J307-3
J307-1
ch5OS
TB2
Scanner travel limit sensor (left)
Scanner home position sensor
Scanner document lead edge sensor
PD1
PD2
PD3
5V G S
J17
J18
J19
ET3
ET5
ET4
ET6
ET4
J602-4
J602-1
J602-2
J3-6
J3-2
J22
GND
+D5V
Contro
Control panel unit


J14-7
J308-1
J22-1
J12-5
J14-8
J308-3
J22-2
J12-4
J501-3
J403-3
J403-4
J604-2
J501-1
J403-1
J403-2
J604-1
J502-10
J11-4
N.C
J11-2
ET8
J32-3
J16-2
J604-3
ET9
J32-1
J16-1
J604-4
J11
J34-2
ET9
(P24V)
J502-9
J5-1
N.C
J5-3
J6-4
ET7
10-1
10-3
15
Video 5ch
J14
N.C
N C
J201
50P
50P
SENSOR
CLK
J303-3
J303-1
J304-3
J304-1
J202
J14-4
J14-1
J14-3
J14-2
J14-8 +D5V
J14-7 DGND
J14-6 +12V
J14-5 12GND
J305-3
J305-1
J306-3
J306-1
J307-3
J307-1
J405 (J505)
CPU CNTL
PRINTER I/F
J407
SENSOR
CLK
J404
20P
20P
J405
Digital
processor PCB
20P
20P
J505
CPU
PCB
J501
24G
24V
N.C
DG
N.C
D5V
J503
16P
16P
J504
10P
10P
J506
34P
34P
J502 PHERIPHERY
SMD
CNTL
DIGI
TIZER
CPU
BUS
J34-6
J34-4
J5-4
J11-1
N.C
J16-3
J33-4
J33-2
J33-1
J34-1
J34-5
J34-3
ET-8
ET-7
J4-8
J4-4
J403
N.C
GND
GND
+5V
+5V
J4-6
J4-7
J4-2
J4-3
J404 PRINTER
40P
40P
J406
CPUBUS
34P
34P
J407 SENSOR CLK
50P
50P
home
sensor
Scanner
document leading
edge sensor
PD3
5V G S
J19
J602-2
J602-1
ET3 → ET5
ET4 → ET6
J3-6
J3-2
J22
GND
+D5V
CPU BUS
34P
34P
J23
J24
J25
50P
50P
50P
50P
Control panel PCB1
Liquid crystal
display
Lamp for liquid
crystal display
-24V
G
-24V
G
Control panel
PCB2
20P
20P
J29
20P
20P
J26
Control
panel
unit
G
-24V
J30
J6-3
J6-7
J32
GND
-24V
+24V
GND
Power supply for
liquid crystal display
HOT
NC
COLD
FL1
G
J31

J14

	Pin	Pin	
J111-2	1	1	N.C
J111-4	2	2	J1-1 +A5V
J111-3	3	3	J1-3 A5G
J111-1	4	4	J1-5 -A5V
J202-4	5	5	J2-3 12G
J202-3	6	6	J2-1 +12V
J202-2	7	7	J3-8 DG
J202-1	8	8	J3-4 +D5V
N C	9	9	N.C

J405 (J505) CPU CNTL

1a	ITOP	4b	RGND
2a	4HINT	5b	RGND
3a	RSYNC	6b	RGND
4a	VLINT	7b	——
5a	SPINT	8b	——
6a	SCLK	9b	——
7a	——	10b	——
8a	——		
9a	——		
10a	——		
1b	RGND		
2b	RGND		
3b	RGND		

PRINTER I/F J404

1	VDϕ	17	VCLK		
2	VDϕ	18	VCLK		
3	VD1	19	RHSYNC		
4	VD1	20	RHSYNC		
5	VD2	21	QHSYNC		
6	VD2	22	QHSYNC		
7	VD3	23	ITOP		
8	VD3	24	ITOP		
9	VD4	25	READY	33	S/C
10	VD4	26	RETGND	34	RETGND
11	VD5	27	SCLK	35	DPRDY
12	VD5	28	RETGND	36	CPRDY
13	VD6	29	CBUSY	37	PRINT
14	VD6	30	RETGND	38	——
15	VD7	31	CBUSY	39	——
16	VD7	32	RETGND	40	——

J407 SENSOR CLK

1	GND	18	ϕV3-OD	35	GND
2	ϕ1-OD	19	GND	36	ϕV5-EV
3	GND	20	ϕV2-OD	37	GND
4	ϕ2-OD	21	GND	38	ϕV4-EV
5	GND	22	ϕV1-OD	39	GND
6	RS-OD	23	GND	40	ϕV3-EV
7	GND	24	ϕ1-EV	41	GND
8	SH-OD	25	GND	42	ϕV2-EV
9	GND	26	ϕ2-EV	43	GND
10	ϕV7-OD	27	GND	44	ϕV1-EV
11	GND	28	RS-EV	45	GND
12	ϕV6-OD	29	GND	46	——
13	GND	30	SH-EV	47	——
14	ϕV5-OD	31	GND	48	——
15	GND	32	ϕV7-EV	49	——
16	ϕV4-OD	33	GND	50	——
17	GND	34	ϕV6-EV		

J503

1	REQ2
2	RETGND
3	ACK7
4	RETGND
5	TXD2
6	RETGND
7	RXD2
8	RETGND
9	CONNECT2
10	RETGND
11	SSTART
12	RETGND
13	MOTON
14	RETGND
15	——
16	——

J504

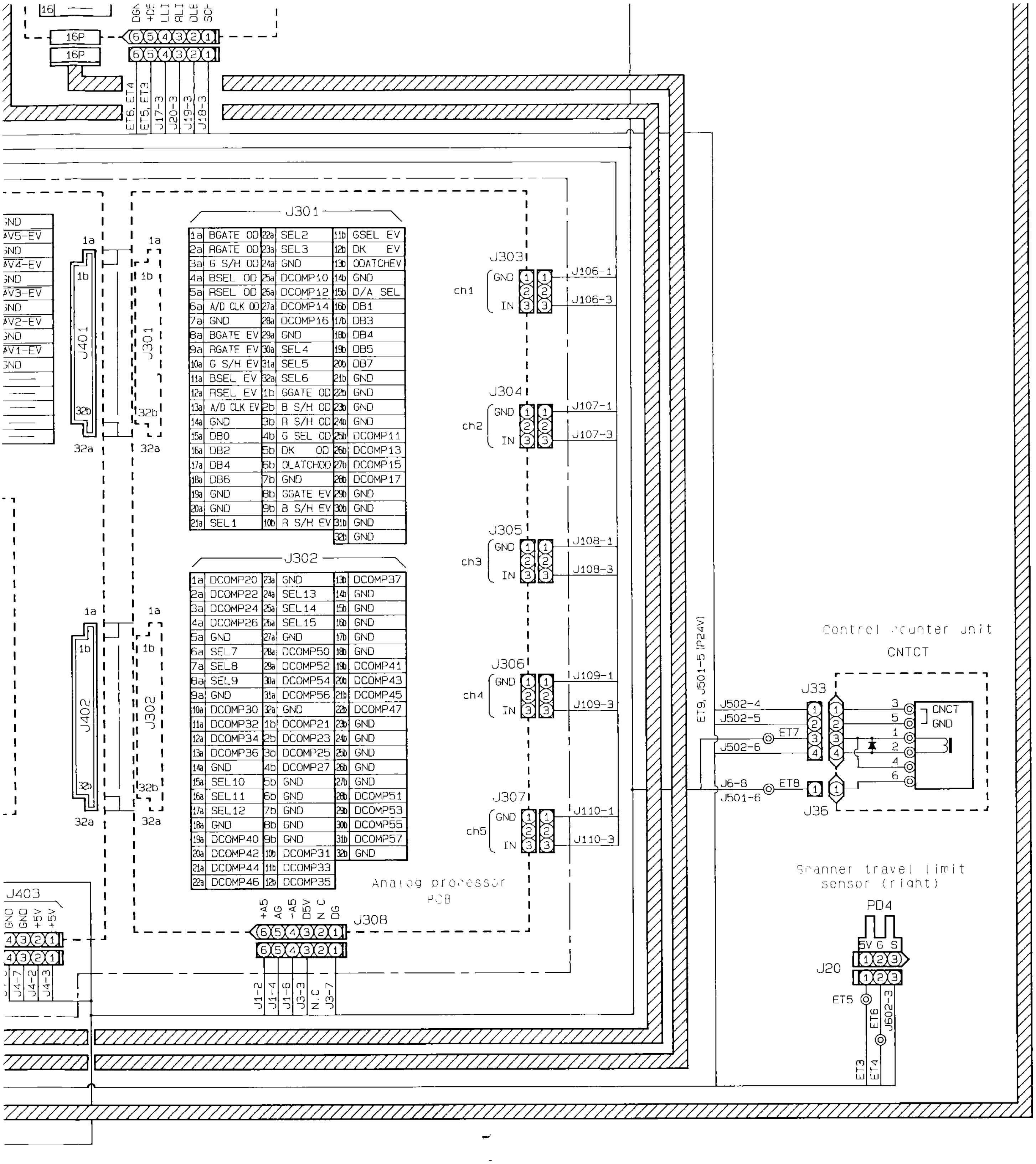
1	REQ1
2	RETGND
3	ACK1
4	RETGND
5	TXD1
6	RETGND
7	RXD1
8	RETGND
9	CONNECT
10	RETGND

J506

1	A12	18	D5
2	GND	19	D4
3	A11	20	GND
4	A10	21	D3
5	A9	22	D2
6	A8	23	D1
7	A7	24	D0
8	A6	25	RD
9	A5	26	WR
10	GND	27	IO/M
11	A4	28	BEN
12	A3	29	R/W
13	A2	30	GND
14	A1	31	MCSE
15	A0	32	RES
16	D7	33	
17	D6	34	GND

J502

1	PCNCT
2	GND
3	POWON
4	CCNTDT
5	GND
6	CCNTD
7	FAN H/L
8	——
9	LRD
10	GND
11	FIMIN
12	REMOTE


16
16P
16P
DGN
+DE
LLI
RLI
DLE
SCF
ET6, ET4
ET5, ET3
J17-3
J20-3
J19-3
J18-3
GND
V5-EV
GND
V4-EV
GND
V3-EV
GND
V2-EV
GND
V1-EV
GND
1a
1b
J401
32b
32a
1a
1b
J301
32b
32a
1a
1b
J402
32b
32a
1a
1b
J302
32b
32a
J301
J302
J303
ch1
GND
IN
J106-1
J106-3
J304
ch2
GND
IN
J107-1
J107-3
J305
ch3
GND
IN
J108-1
J108-3
J306
ch4
GND
IN
J109-1
J109-3
J307
ch5
GND
IN
J110-1
J110-3
Analog processor
PCB
+A5
AG
-A5
D5V
N C
DG
J308
J1-2
J1-4
J1-6
J3-3
N.C
J3-7
J403
GND
GND
+5V
+5V
J4-7
J4-2
J4-3
ET9, J501-5 (P24V)
Control counter unit
CNTCT
J33
J502-4
J502-5
ET7
J502-6
J6-8
ET8
J501-6
J36
3
5
1
2
4
6
CNCT
GND
Scanner travel limit
sensor (right)
PD4
5V
G
S
J20
ET5
ET6
J602-3
ET3
ET4

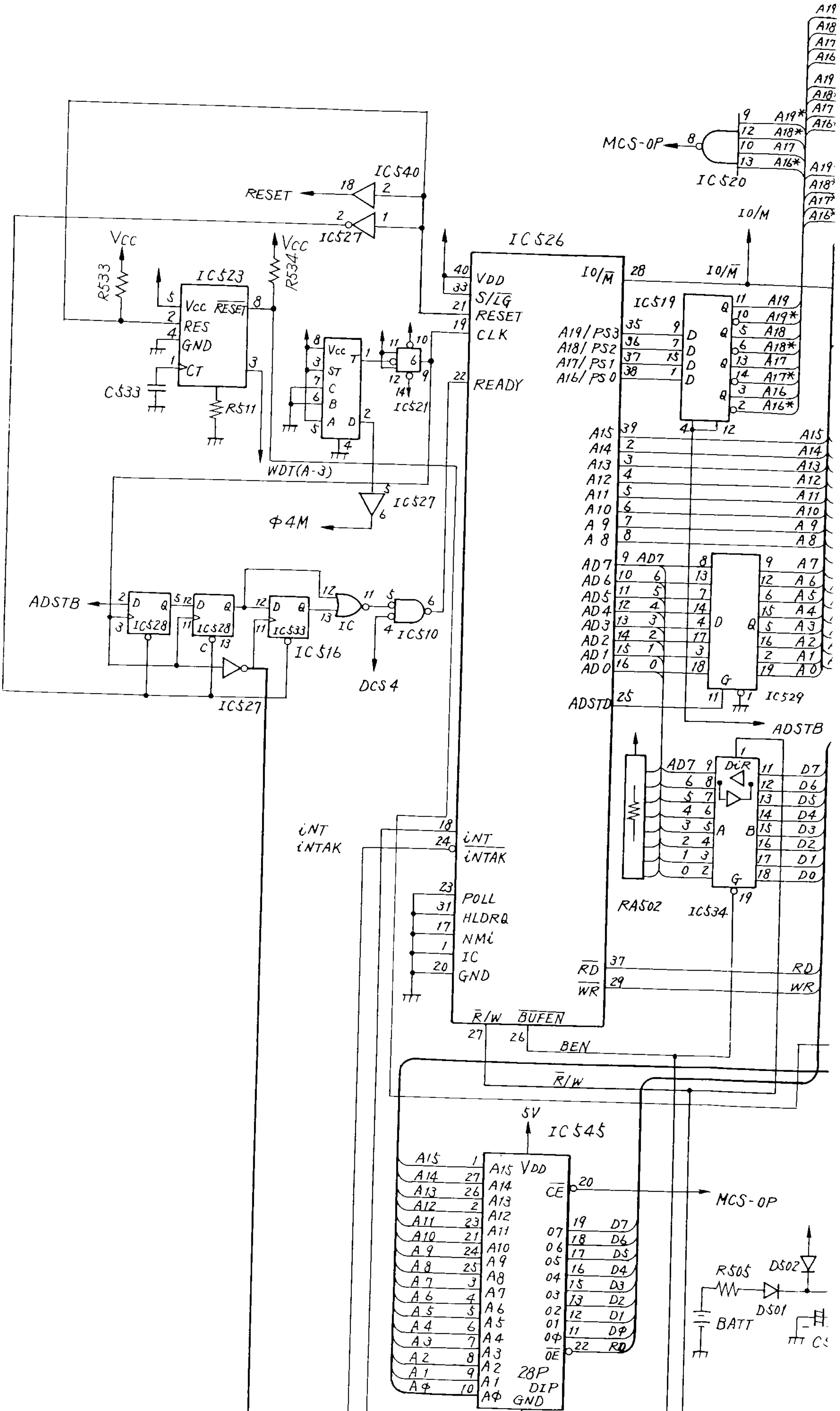
J301

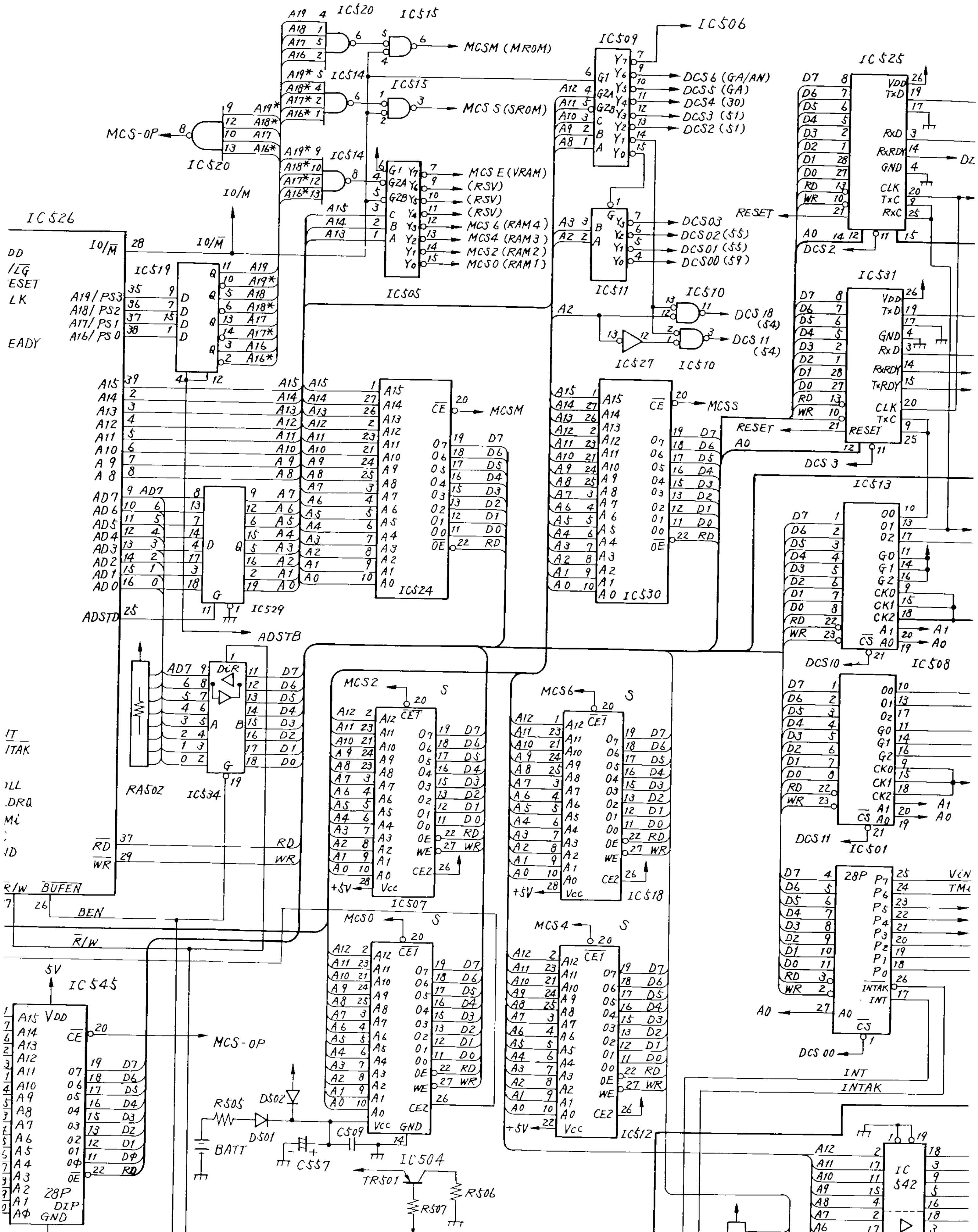
1a	BGATE OD	22a	SEL2	11b	GSEL EV
2a	RGATE OD	23a	SEL3	12b	DK EV
3a	G S/H OD	24a	GND	13b	ODATCHEV
4a	BSEL OD	25a	DCOMP10	14b	GND
5a	RSEL OD	26a	DCOMP12	15b	D/A SEL
6a	A/D CLK OD	27a	DCOMP14	16b	DB1
7a	GND	28a	DCOMP16	17b	DB3
8a	BGATE EV	29a	GND	18b	DB4
9a	RGATE EV	30a	SEL4	19b	DB5
10a	G S/H EV	31a	SEL5	20b	DB7
11a	BSEL EV	32a	SEL6	21b	GND
12a	RSEL EV	1b	GGATE OD	22b	GND
13a	A/D CLK EV	2b	B S/H OD	23b	GND
14a	GND	3b	R S/H OD	24b	GND
15a	DB0	4b	G SEL OD	25b	DCOMP11
16a	DB2	5b	DK OD	26b	DCOMP13
17a	DB4	6b	OLATCHOD	27b	DCOMP15
18a	DB6	7b	GND	28b	DCOMP17
19a	GND	8b	GGATE EV	29b	GND
20a	GND	9b	B S/H EV	30b	GND
21a	SEL1	10b	R S/H EV	31b	GND
				32b	GND

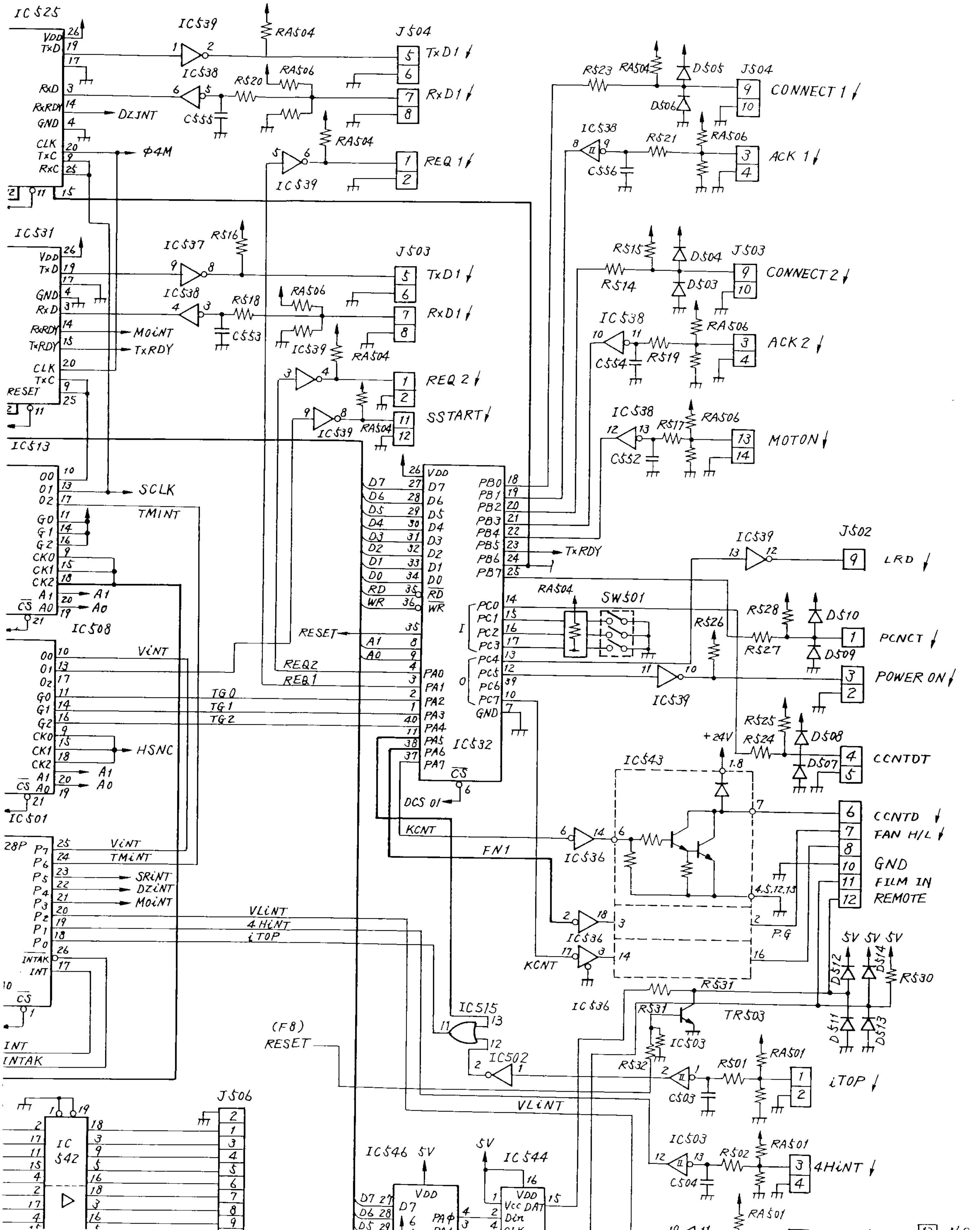
J302

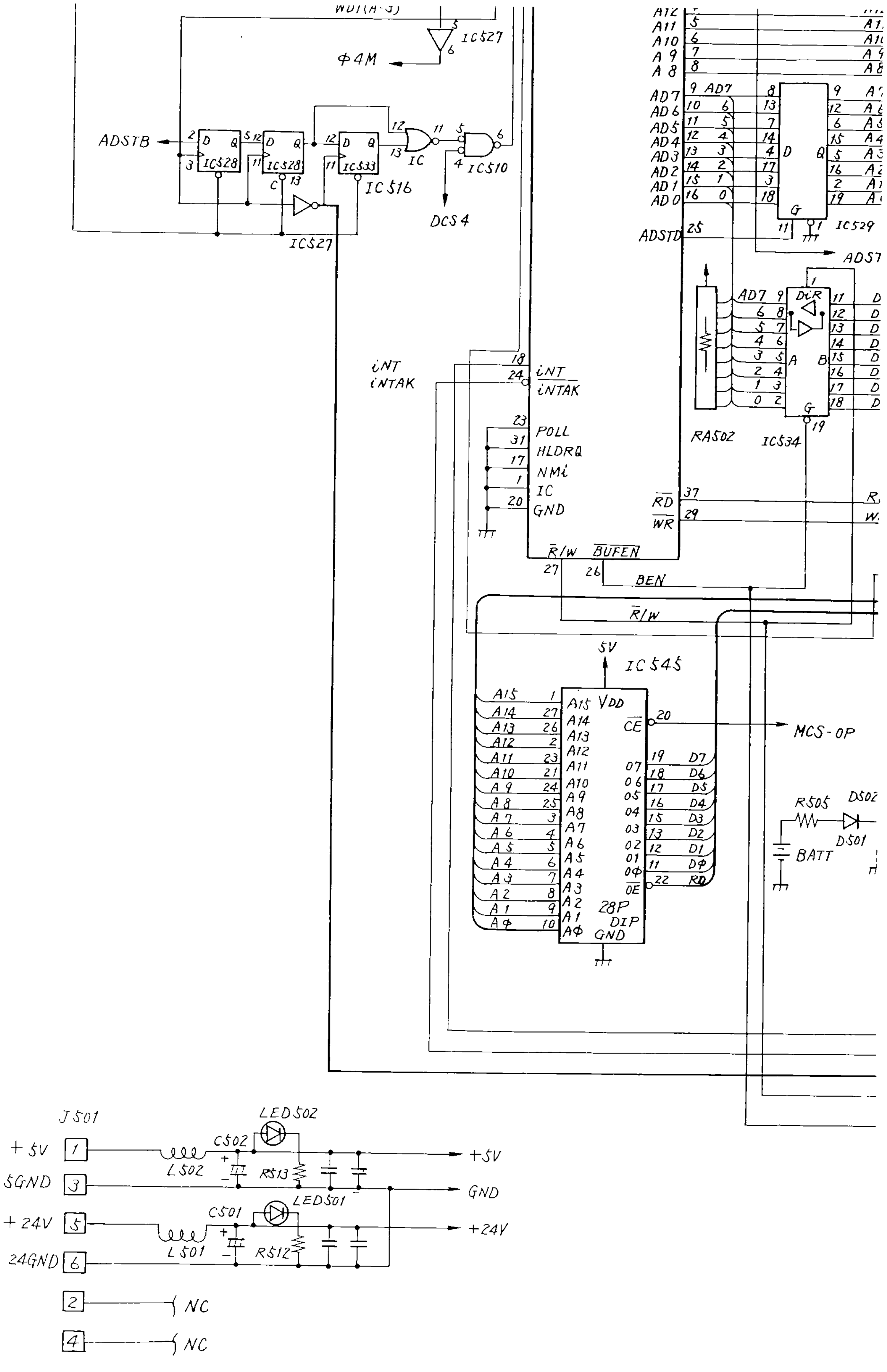
1a	DCOMP20	23a	GND	13b	DCOMP37
2a	DCOMP22	24a	SEL13	14b	GND
3a	DCOMP24	25a	SEL14	15b	GND
4a	DCOMP26	26a	SEL15	16b	GND
5a	GND	27a	GND	17b	GND
6a	SEL7	28a	DCOMP50	18b	GND
7a	SEL8	29a	DCOMP52	19b	DCOMP41
8a	SEL9	30a	DCOMP54	20b	DCOMP43
9a	GND	31a	DCOMP56	21b	DCOMP45
10a	DCOMP30	32a	GND	22b	DCOMP47
11a	DCOMP32	1b	DCOMP21	23b	GND
12a	DCOMP34	2b	DCOMP23	24b	GND
13a	DCOMP36	3b	DCOMP25	25b	GND
14a	GND	4b	DCOMP27	26b	GND
15a	SEL10	5b	GND	27b	GND
16a	SEL11	6b	GND	28b	DCOMP51
17a	SEL12	7b	GND	29b	DCOMP53
18a	GND	8b	GND	30b	DCOMP55
19a	DCOMP40	9b	GND	31b	DCOMP57
20a	DCOMP42	10b	DCOMP31	32b	GND
21a	DCOMP44	11b	DCOMP33		
22a	DCOMP46	12b	DCOMP35		

CPU PCB

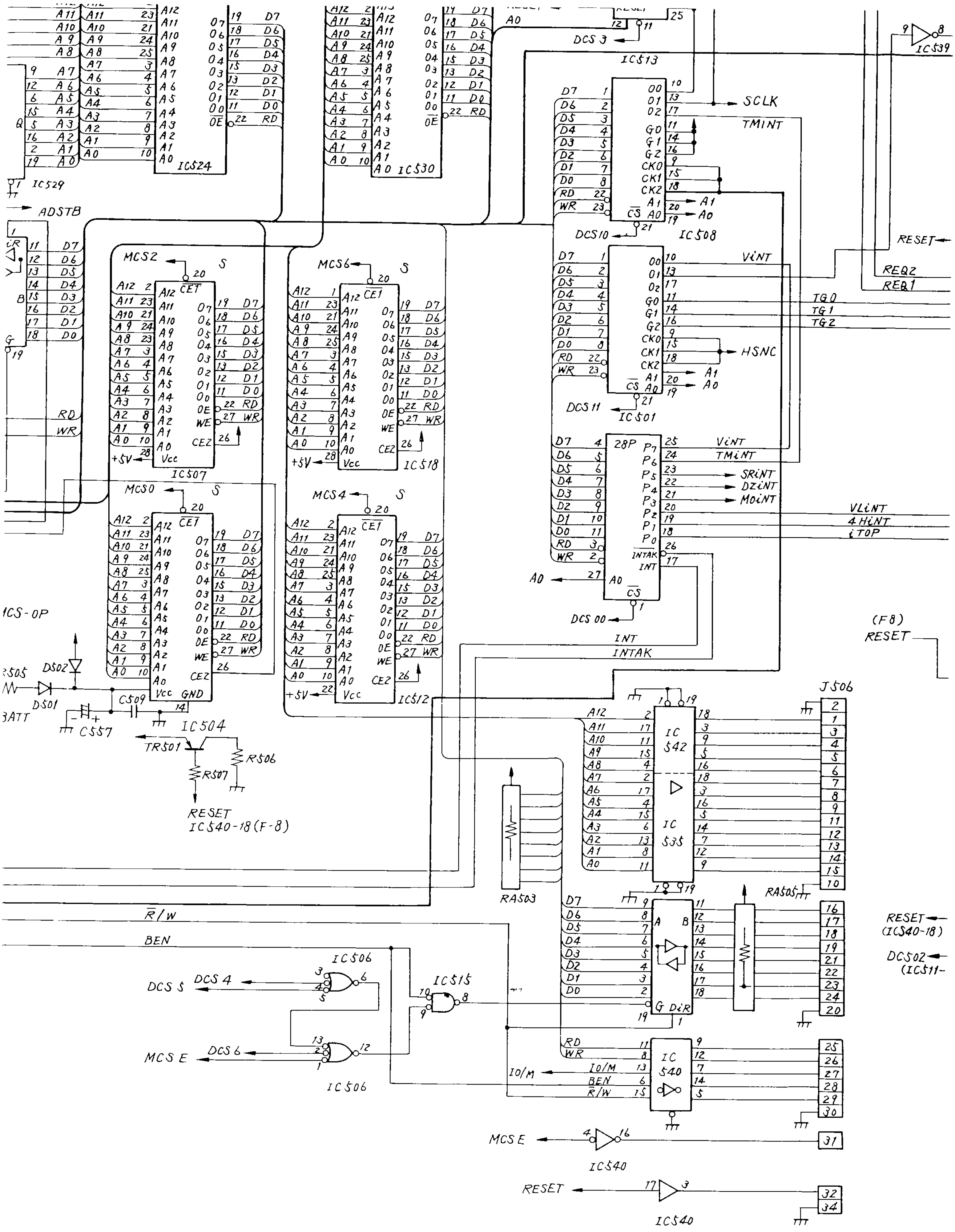

IC526
VDD
S/LG
RESET
CLK
READY
IO/M
A19/PS3
A18/PS2
A17/PS1
A16/PS0
AD7
AD6
AD5
AD4
AD3
AD2
AD1
AD0
ADSTB
INT
INTAK
POLL
HLDRQ
NMI
IC
GND
RD
WR
R/W
BUFEN
BEN
IC540
RESET
IC527
IC523
Vcc
RES
GND
CT
RESET
R533
R534
Vcc
C533
R511
IC521
WDT(A-3)
Φ4M
ADSTB
IC528
IC533
IC516
IC510
DCS4
MCS-OP
IC520
IC519
IC529
RA502
IC534
DIR
IC545
5V
A15
A14
A13
A12
A11
A10
A9
A8
A7
A6
A5
A4
A3
A2
A1
AΦ
CE
OE
28P
DIP
D7
D6
D5
D4
D3
D2
D1
DΦ
R505
D502
D501
BATT

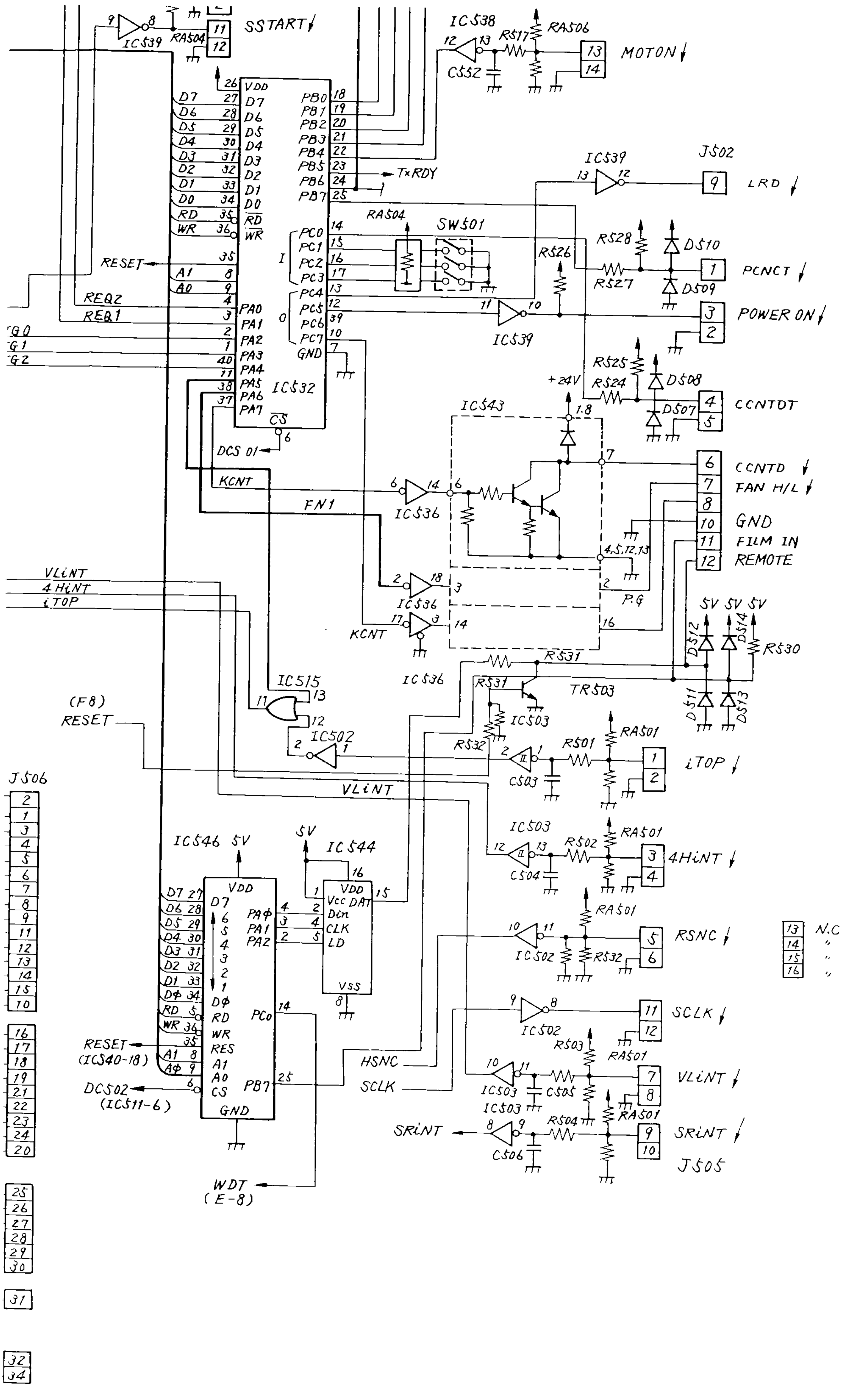

IC520
IC515
MCSM (MROM)
IC514
MCS5 (SROM)
MCS-0P
IC509
IC506
DCS6 (GA/AN)
DCS5 (GA)
DCS4 (30)
DCS3 (51)
DCS2 (51)
IC525
MCS E (VRAM)
(RSV)
(RSV)
(RSV)
MCS6 (RAM4)
MCS4 (RAM3)
MCS2 (RAM2)
MCS0 (RAM1)
IC505
IC511
DCS03
DCS02 (55)
DCS01 (55)
DCS00 (59)
RESET
DCS2
IC526
IO/M
IC519
A19/PS3
A18/PS2
A17/PS1
A16/PS0
IC510
DCS18 (54)
DCS11 (54)
IC527
IC531
IC524
MCSM
IC530
MCSS
RESET
A0
DCS3
IC513
IC529
ADSTB
ADSTD
RA502
IC534
DCS10
IC508
MCS2
MCS6
IC507
IC518
DCS11
IC501
RD
WR
BUFEN
BEN
R/W
MCS0
MCS4
28P
VIN
TM
A0
DCS00
INT
INTAK
5V
IC545
MCS-0P
28P DIP
R505
D502
D501
BATT
C509
C557
IC504
TR501
R506
R507
IC512
+5V
IC 542


IC525
VDD
TxD
RxD
RxRDY
GND
CLK
TxC
RxC
DZINT
Φ4M
IC539
IC538
RA504
RA506
R520
C555
J504
TxD1
RxD1
REQ1
R523
D505
D506
CONNECT1
IC538
C556
R521
ACK1
IC531
RESET
IC537
R516
R518
C553
MOINT
TxRDY
J503
IC539
REQ2
SSTART
R515
D504
D503
R514
CONNECT2
C554
R519
ACK2
R517
C552
MOTON
IC513
SCLK
TMINT
A1
A0
CS
IC508
VINT
TG0
TG1
TG2
HSNC
IC501
28P
SRINT
DZINT
MOINT
VLINT
4HINT
iTOP
INTAK
INT
D7
D6
D5
D4
D3
D2
D1
D0
RD
WR
VDD
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
GND
I
O
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
IC532
DCS 01
KCNT
FN1
J502
LRD
RA504
SW501
R528
D510
R526
R527
D509
PCNCT
POWER ON
R525
D508
R524
D507
CCNTDT
+24V
IC543
1.8
CCNTD
FAN H/L
GND
FILM IN
REMOTE
IC536
P.G
4.5.12.13
5V
D512
D514
R530
D511
D513
R531
TR503
IC515
(F8)
RESET
IC502
R532
IC503
R501
RA501
C503
iTOP
VLINT
J506
IC542
IC546
IC544
R502
C504
4HINT
VDD
Vcc DAT
Din
PAΦ

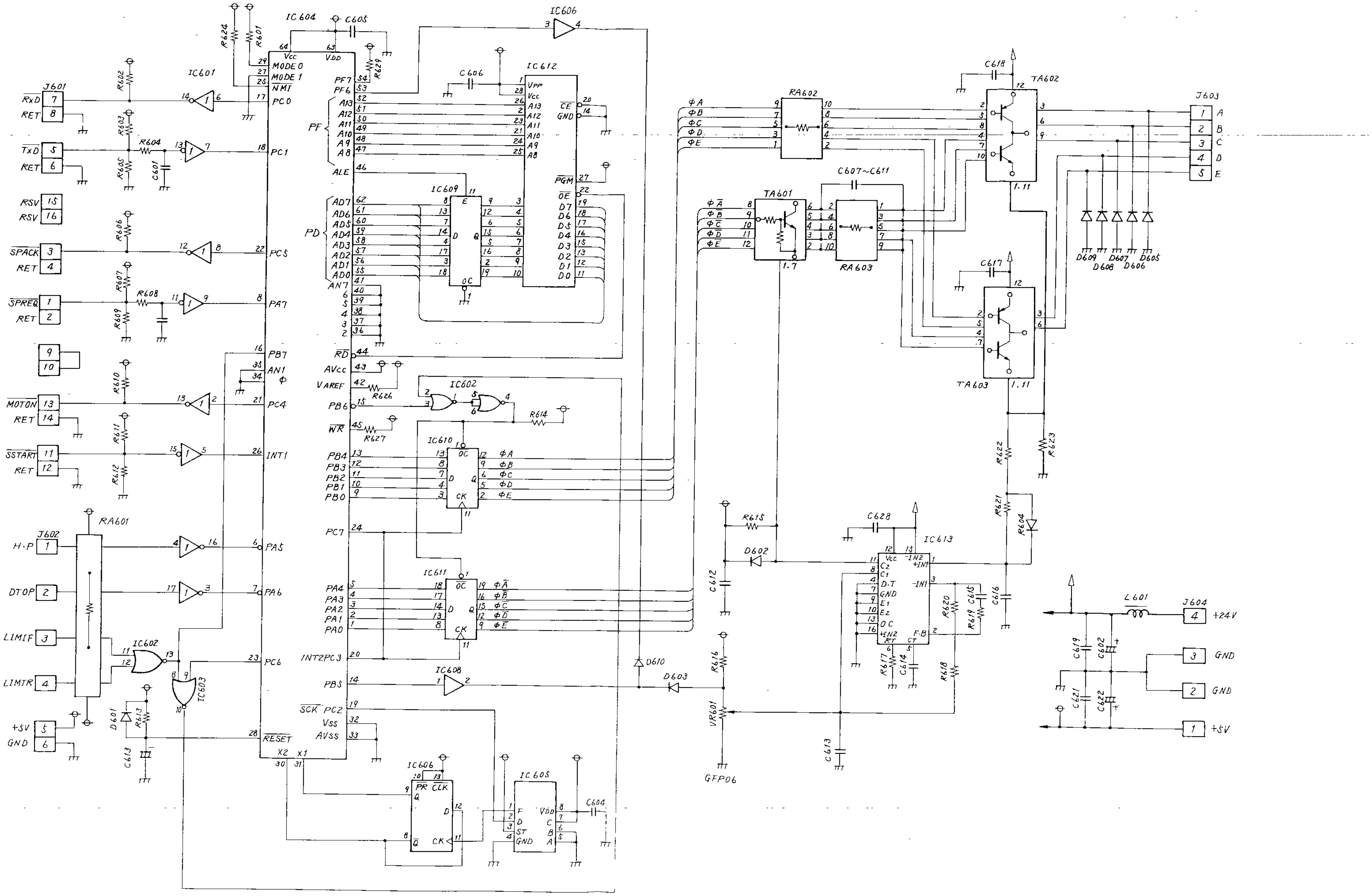


IC527
Φ4M
ADSTB
IC528
IC528
IC533
IC516
IC510
IC527
DCS4
A12
A11
A10
A9
A8
AD7
AD6
AD5
AD4
AD3
AD2
AD1
AD0
ADSTD
IC529
ADST
RA502
IC534
DIR
INT
INTAK
POLL
HLDRQ
NMI
IC
GND
RD
WR
R/W
BUFEN
BEN
5V
IC545
VDD
CE
MCS-OP
OE
28P DIP
GND
R505
D502
D501
BATT
J501
+5V
5GND
+24V
24GND
LED502
LED501
C502
C501
L502
L501
R513
R512
+5V
GND
+24V
NC
NC

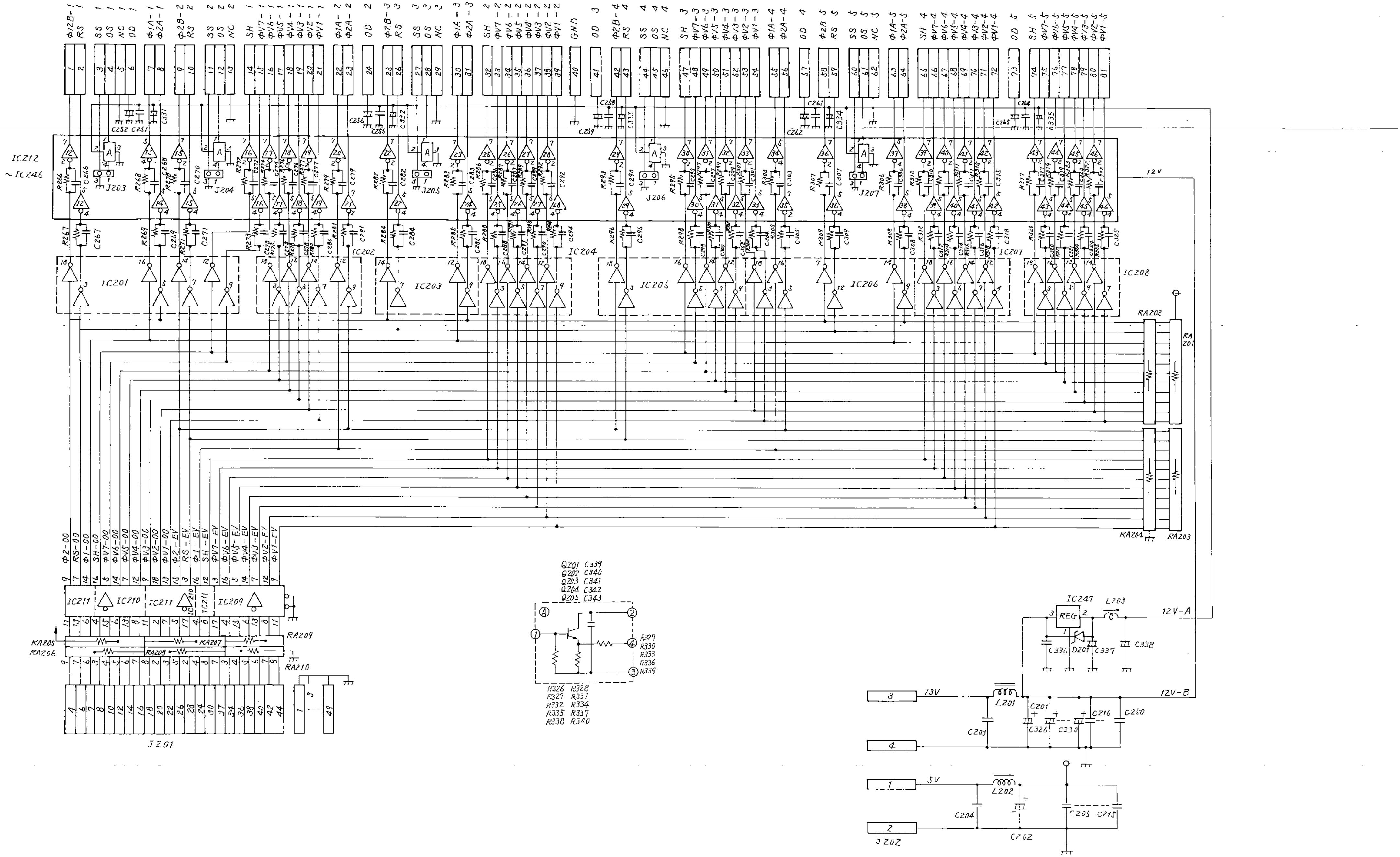

IC524
IC530
IC529
ADSTB
IC513
IC539
RESET
DCS 3
A0
SCLK
TMINT
IC508
DCS10
A1
A0
D7 D6 D5 D4 D3 D2 D1 D0
A12 A11 A10 A9 A8 A7 A6 A5 A4 A3 A2 A1 A0
O7 O6 O5 O4 O3 O2 O1 O0
OE
RD
WR
CS
G0 G1 G2
CK0 CK1 CK2
MCS2
MCS6
MCS0
MCS4
S
CE1
CE2
WE
Vcc
GND
+5V
IC507
IC518
IC512
IC501
DCS 11
VINT
TG0
TG1
TG2
REQ2
REQ1
HSNC
28P
P7 P6 P5 P4 P3 P2 P1 P0
INTAK
INT
SRINT
DZINT
MOINT
VLINT
4HINT
iTOP
DCS 00
(F8)
RESET
ICS-OP
R505
D502
D501
BATT
C509
C557
IC504
TR501
R506
R507
RESET
IC540-18 (F-8)
J506
IC 542
IC 535
RA503
RA505
R/W
BEN
IC506
DCS 4
DCS 5
DCS 6
MCS E
IC515
A
B
G
DIR
IC 540
IO/M
RESET (IC540-18)
DCS02 (IC511-
IC540

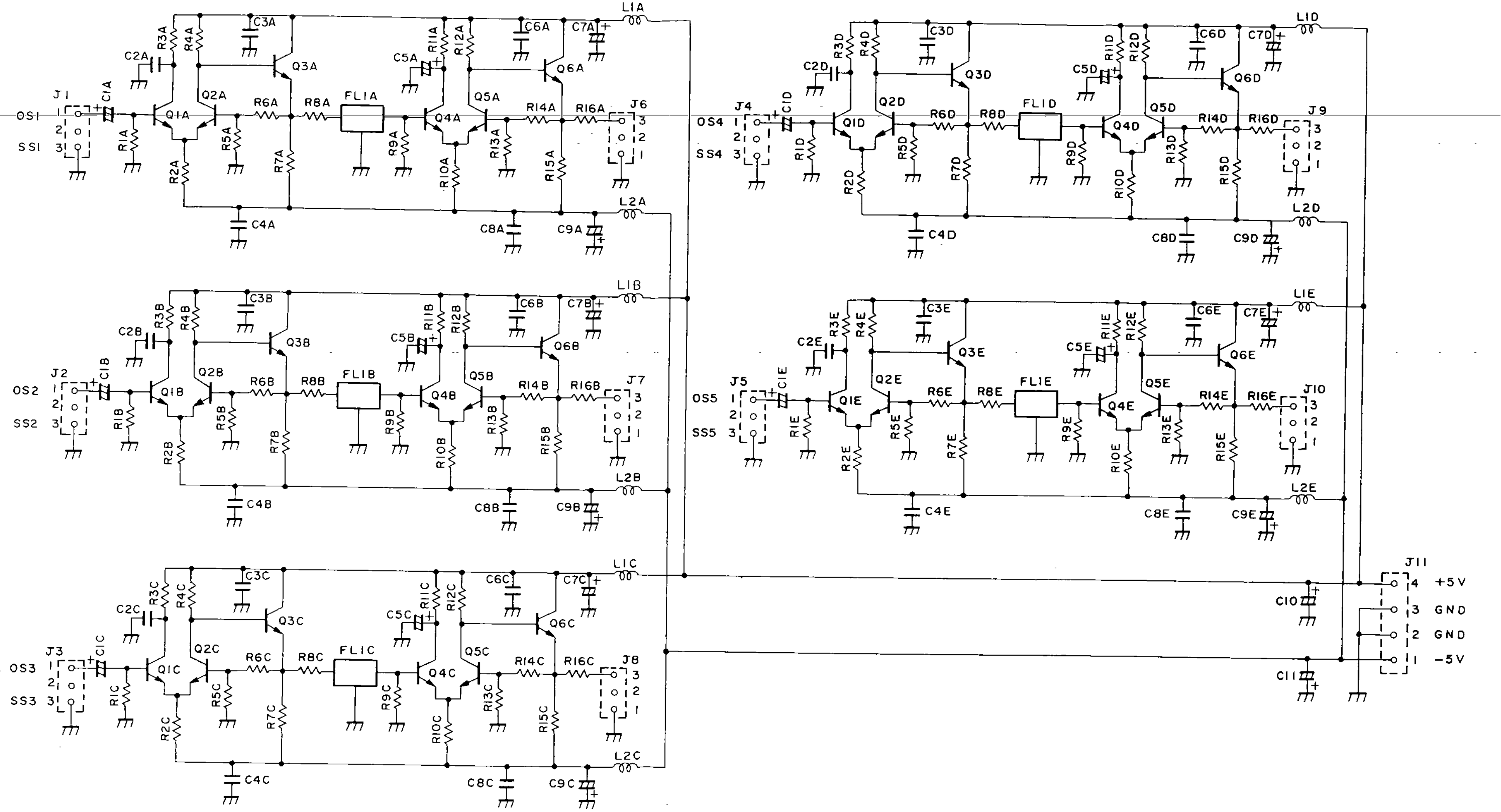

IC539
RA504
SSTART
IC538
R517
RA506
C552
MOTON
VDD
D7
D6
D5
D4
D3
D2
D1
D0
RD
WR
RESET
A1
A0
REQ2
REQ1
G0
G1
G2
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
CS
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
TxRDY
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
GND
IC532
DCS 01
SW501
J502
LRD
R528
D510
R526
R527
D509
PCNCT
POWER ON
R525
R524
+24V
D508
D507
CCNTDT
IC543
CCNTD
FAN H/L
GND
FILM IN
REMOTE
KCNT
FN1
IC536
P.G
5V
D512
D514
R530
R531
TR503
D511
D513
IC515
(F8)
RESET
IC502
R532
IC503
R501
RA501
C503
iTOP
VLiNT
4HiNT
J506
IC546
IC544
R502
C504
VDD
Vcc
DAT
Din
CLK
LD
VSS
PAΦ
PA1
PA2
RSNC
SCLK
R503
C505
R504
C506
SRiNT
HSNC
RES
PCo
PB7
RESET (IC540-18)
DCS02 (IC511-6)
WDT (E-8)
J505
N.C

E. SCANNER MOTOR CONTROL PCB


IC604
IC601
IC602
IC603
IC605
IC606
IC608
IC609
IC610
IC611
IC612
IC613
J601
J602
J603
J604
RA601
RA602
RA603
TA601
TA602
TA603
C607~C611
VR601
L601
RxD
TxD
RET
RSV
SPACK
SPREQ
MOTON
SSTART
H·P
DTOP
LIMIF
LIMTR
+5V
GND
+24V
MODE 0
MODE 1
NMI
PC0
PC1
PC5
PA7
PB7
AN1
PC4
INT1
PA5
PA6
PC6
RESET
PF7
PF6
PF
PD
ALE
AVcc
VAREF
PB6
WR
RD
PB4
PB3
PB2
PB1
PB0
PC7
PA4
PA3
PA2
PA1
PA0
INT2PC3
PB5
SCK PC2
Vss
AVss
X2
X1
ΦA
ΦB
ΦC
ΦD
ΦE
A
B
C
D
E
GFP06

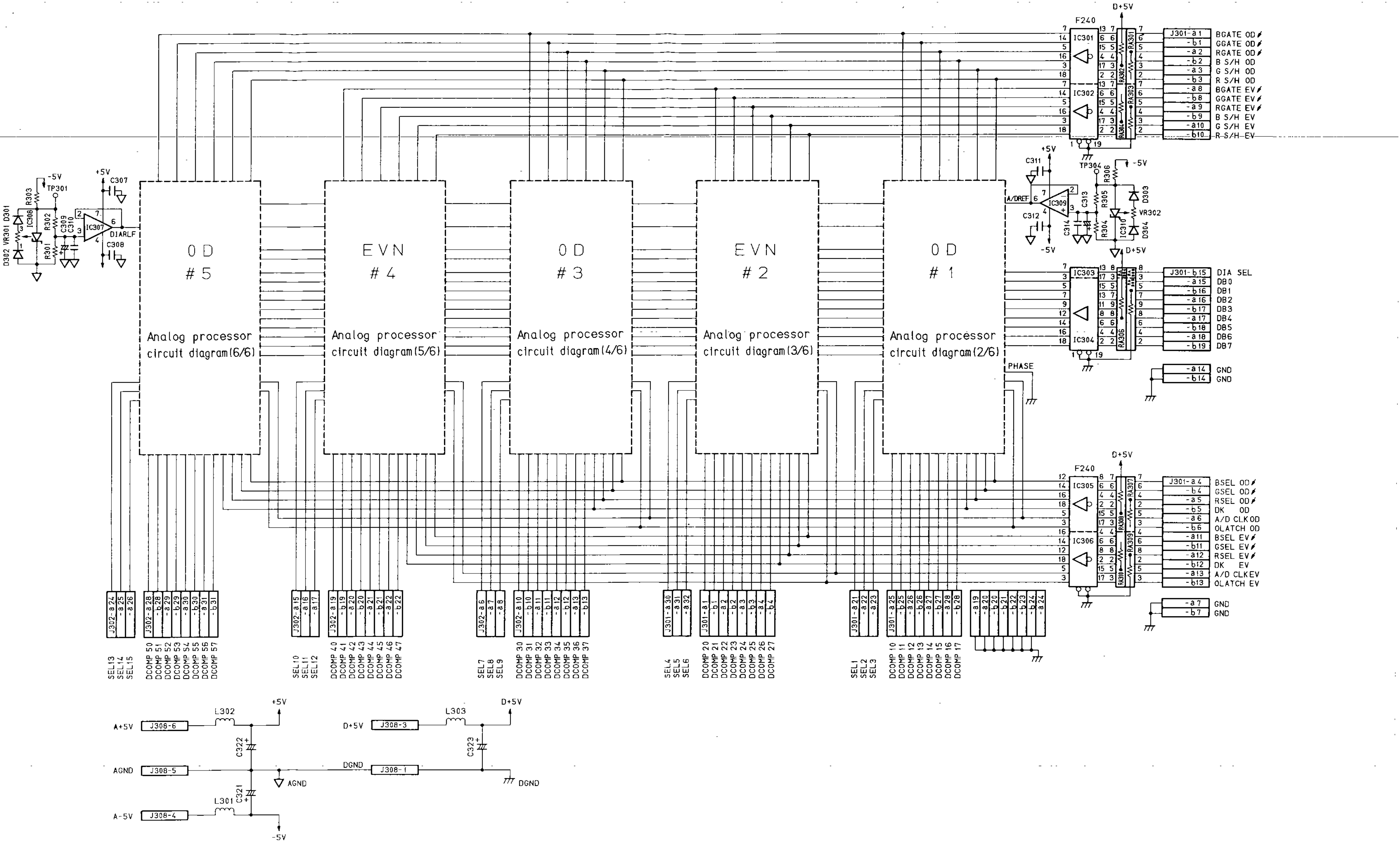
F. CCD DRIVER PCB

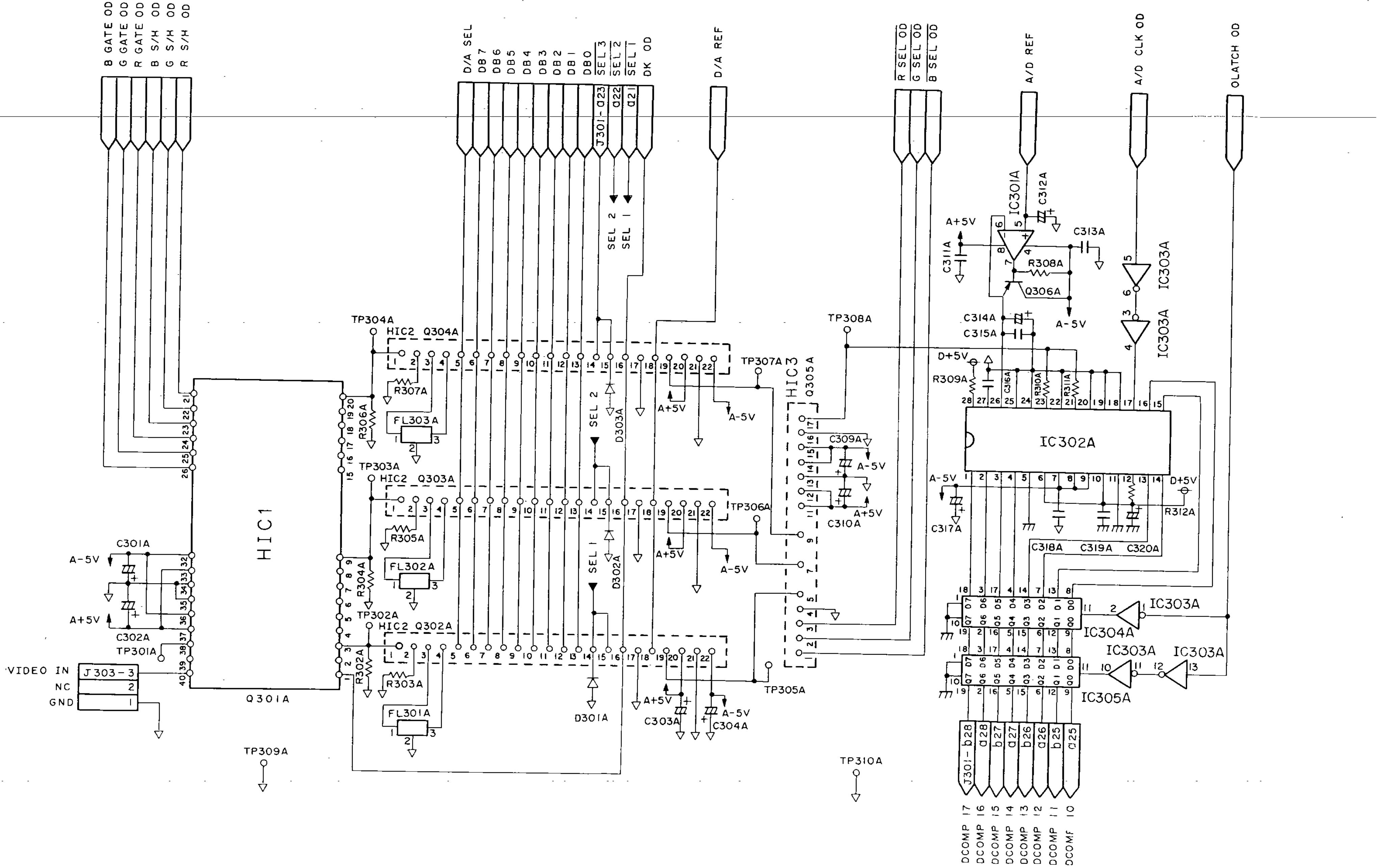

IC212
~IC246
IC201
IC202
IC203
IC204
IC205
IC206
IC207
IC208
IC209
IC210
IC211
IC247
REG
J201
J202
J203
J204
J205
J206
J207
RA201
RA202
RA203
RA204
RA205
RA206
RA207
RA208
RA209
RA210
L201
L202
L203
DZ01
12V
12V-A
12V-B
13V
5V
GND
Q201 C339
Q202 C340
Q203 C341
Q204 C342
Q205 C343
R326 R328
R329 R331
R332 R334
R335 R337
R338 R340
R327
R330
R333
R336
R339


OS1
SS1
J1
C1A
R1A
C2A
R3A
R4A
R2A
Q1A
Q2A
R5A
C3A
Q3A
R6A
R7A
R8A
FL1A
C4A
C5A
R11A
R12A
R9A
Q4A
Q5A
R10A
R13A
C6A
Q6A
R14A
R15A
R16A
C7A
C8A
C9A
L1A
L2A
J6
OS2
SS2
J2
C1B
R1B
C2B
R3B
R4B
R2B
Q1B
Q2B
R5B
C3B
Q3B
R6B
R7B
R8B
FL1B
C4B
C5B
R11B
R12B
R9B
Q4B
Q5B
R10B
R13B
C6B
Q6B
R14B
R15B
R16B
C7B
C8B
C9B
L1B
L2B
J7
OS3
SS3
J3
C1C
R1C
C2C
R3C
R4C
R2C
Q1C
Q2C
R5C
C3C
Q3C
R6C
R7C
R8C
FL1C
C4C
C5C
R11C
R12C
R9C
Q4C
Q5C
R10C
R13C
C6C
Q6C
R14C
R15C
R16C
C7C
C8C
C9C
L1C
L2C
J8
OS4
SS4
J4
C1D
R1D
C2D
R3D
R4D
R2D
Q1D
Q2D
R5D
C3D
Q3D
R6D
R7D
R8D
FL1D
C4D
C5D
R11D
R12D
R9D
Q4D
Q5D
R10D
R13D
C6D
Q6D
R14D
R15D
R16D
C7D
C8D
C9D
L1D
L2D
J9
OS5
SS5
J5
C1E
R1E
C2E
R3E
R4E
R2E
Q1E
Q2E
R5E
C3E
Q3E
R6E
R7E
R8E
FL1E
C4E
C5E
R11E
R12E
R9E
Q4E
Q5E
R10E
R13E
C6E
Q6E
R14E
R15E
R16E
C7E
C8E
C9E
L1E
L2E
J10
J11
4 +5V
3 GND
2 GND
1 −5V
C10
C11

H. ANALOG PROCESSOR PCB

Analog processor circuit diagram (1/6)


D+5V
F240
IC301
IC302
RA301
RA302
RA303
RA304
J301-a1
-b1
-a2
-b2
-a3
-b3
-a8
-b8
-a9
-b9
-a10
-b10
BGATE OD
GGATE OD
RGATE OD
B S/H OD
G S/H OD
R S/H OD
BGATE EV
GGATE EV
RGATE EV
B S/H EV
G S/H EV
R S/H EV
+5V
-5V
C311
C312
C313
C314
TP304
R304
R305
R306
D303
D304
VR302
IC309
IC310
A/DREF
IC303
IC304
RA305
RA306
J301-b15
-a15
-b16
-a16
-b17
-a17
-b18
-a18
-b19
DIA SEL
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
-a14
-b14
GND
GND
PHASE
TP301
R301
R302
R303
IC307
IC308
C307
C308
C309
C310
D301
D302
VR301
DIARLF
OD #5
Analog processor circuit diagram(6/6)
EVN #4
Analog processor circuit diagram(5/6)
OD #3
Analog processor circuit diagram(4/6)
EVN #2
Analog processor circuit diagram(3/6)
OD #1
Analog processor circuit diagram(2/6)
IC305
IC306
RA307
RA308
RA309
RA310
J301-a4
-b4
-a5
-b5
-a6
-b6
-a11
-b11
-a12
-b12
-a13
-b13
BSEL OD
GSEL OD
RSEL OD
DK OD
A/D CLK OD
OLATCH OD
BSEL EV
GSEL EV
RSEL EV
DK EV
A/D CLK EV
OLATCH EV
-a7
-b7
GND
GND
J302-a24 -a25 -a26
SEL13 SEL14 SEL15
J302-a28 -b28 -a29 -b29 -a30 -b30 -a31 -b31
DCOMP 50 DCOMP 51 DCOMP 52 DCOMP 53 DCOMP 54 DCOMP 55 DCOMP 56 DCOMP 57
J302-a15 -a16 -a17
SEL10 SEL11 SEL12
J302-a19 -b19 -a20 -b20 -a21 -b21 -a22 -b22
DCOMP 40 DCOMP 41 DCOMP 42 DCOMP 43 DCOMP 44 DCOMP 45 DCOMP 46 DCOMP 47
J302-a6 -a7 -a8
SEL7 SEL8 SEL9
J302-a10 -b10 -a11 -b11 -a12 -b12 -a13 -b13
DCOMP 30 DCOMP 31 DCOMP 32 DCOMP 33 DCOMP 34 DCOMP 35 DCOMP 36 DCOMP 37
J301-a30 -a31 -a32
SEL4 SEL5 SEL6
J301-a1 -b1 -a2 -b2 -a3 -b3 -a4 -b4
DCOMP 20 DCOMP 21 DCOMP 22 DCOMP 23 DCOMP 24 DCOMP 25 DCOMP 26 DCOMP 27
J301-a21 -a22 -a23
SEL1 SEL2 SEL3
J301-a25 -b25 -a26 -b26 -a27 -b27 -a28 -b28
DCOMP 10 DCOMP 11 DCOMP 12 DCOMP 13 DCOMP 14 DCOMP 15 DCOMP 16 DCOMP 17
-a19 -a20 -b21 -a22 -b22 -b23 -b24 -a24
A+5V
J308-6
L302
C322
AGND
J308-5
AGND
DGND
J308-1
DGND
L301
C321
A-5V
J308-4
-5V
D+5V
J308-3
L303
C323


B GATE OD
G GATE OD
R GATE OD
B S/H OD
G S/H OD
R S/H OD
D/A SEL
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SEL 3
SEL 2
SEL 1
DK OD
J301-a23
a22
a21
D/A REF
R SEL OD
G SEL OD
B SEL OD
A/D REF
A/D CLK OD
OLATCH OD
SEL 2
SEL 1
IC301A
C312A
C313A
C311A
A+5V
R308A
Q306A
A-5V
C314A
C315A
IC303A
TP308A
D+5V
R309A
C316A
R310A
R311A
IC302A
A-5V
D+5V
C317A
R312A
C318A
C319A
C320A
TP304A
HIC2 Q304A
R307A
FL303A
R306A
TP307A
A+5V
A-5V
SEL 2
D303A
HIC3 Q305A
C309A
C310A
TP303A
HIC2 Q303A
R305A
FL302A
R304A
TP306A
SEL 1
D302A
TP302A
HIC2 Q302A
R303A
FL301A
R302A
D301A
C303A
C304A
TP305A
HIC1
Q301A
C301A
C302A
TP301A
VIDEO IN
NC
GND
J303-3
2
1
IC304A
IC305A
TP309A
TP310A
J301-b28
a28
b27
a27
b26
a26
b25
a25
DCOMP 17
DCOMP 16
DCOMP 15
DCOMP 14
DCOMP 13
DCOMP 12
DCOMP 11
DCOMP 10

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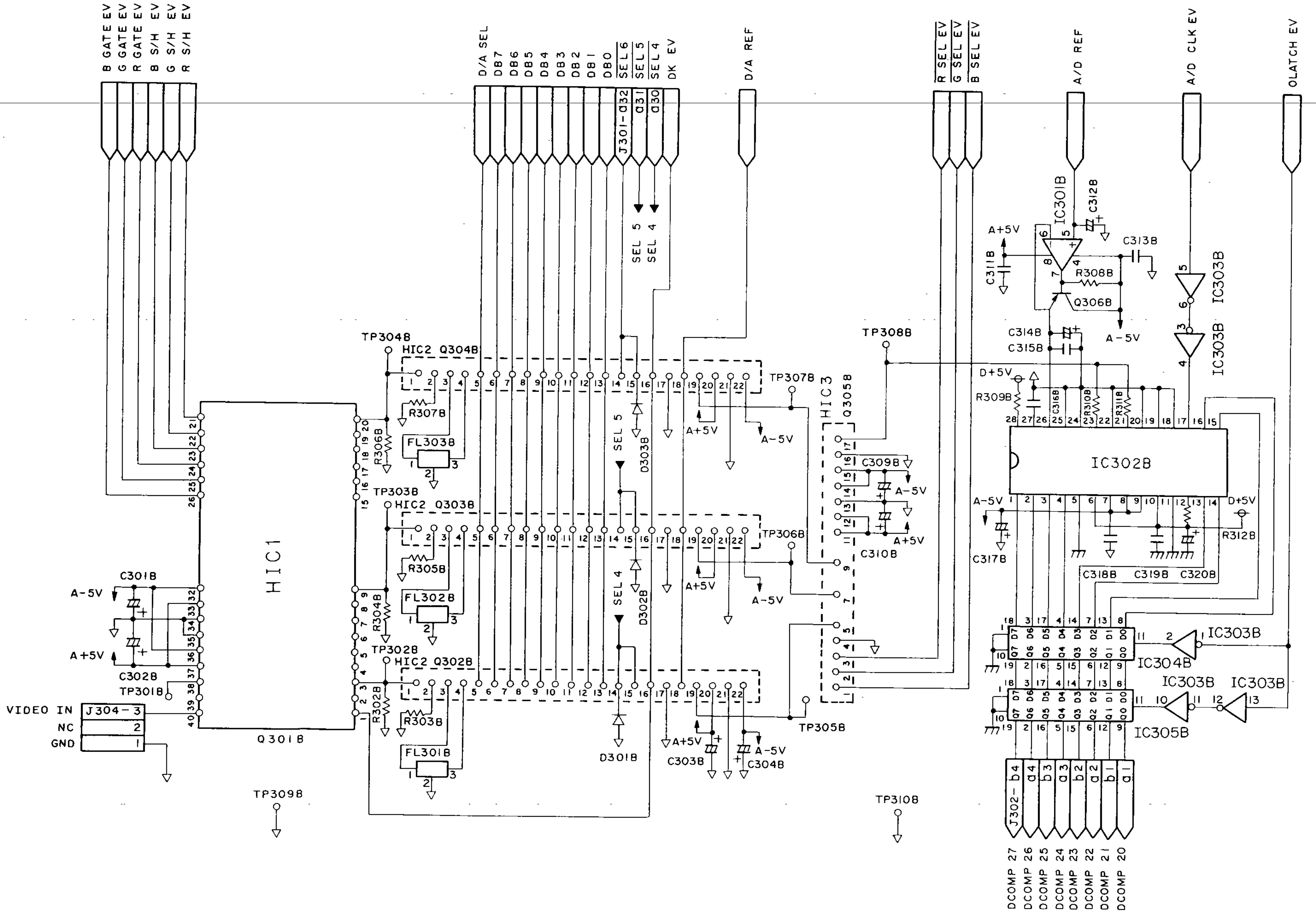
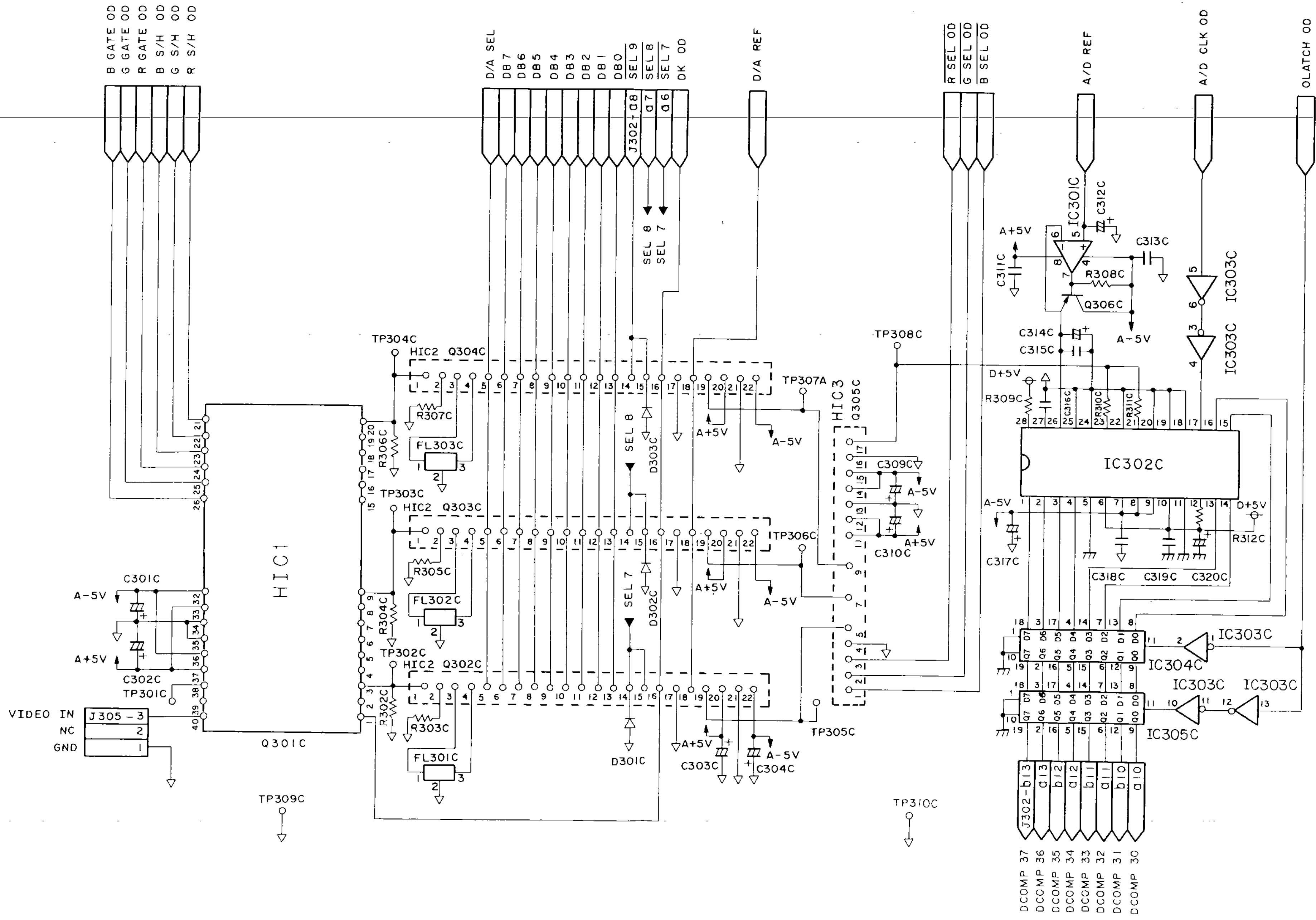
Analog processor circuit diagram (3/6)

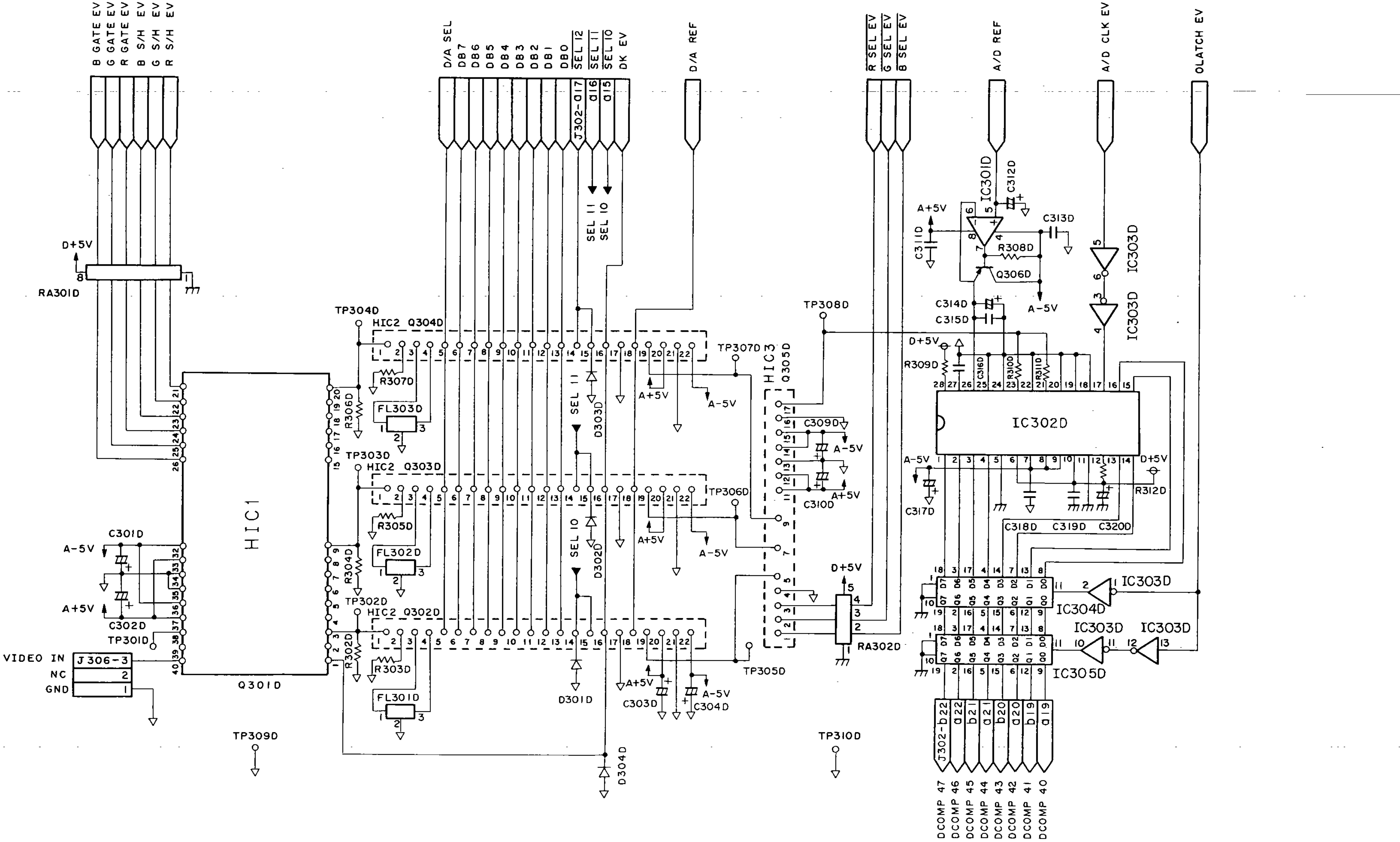


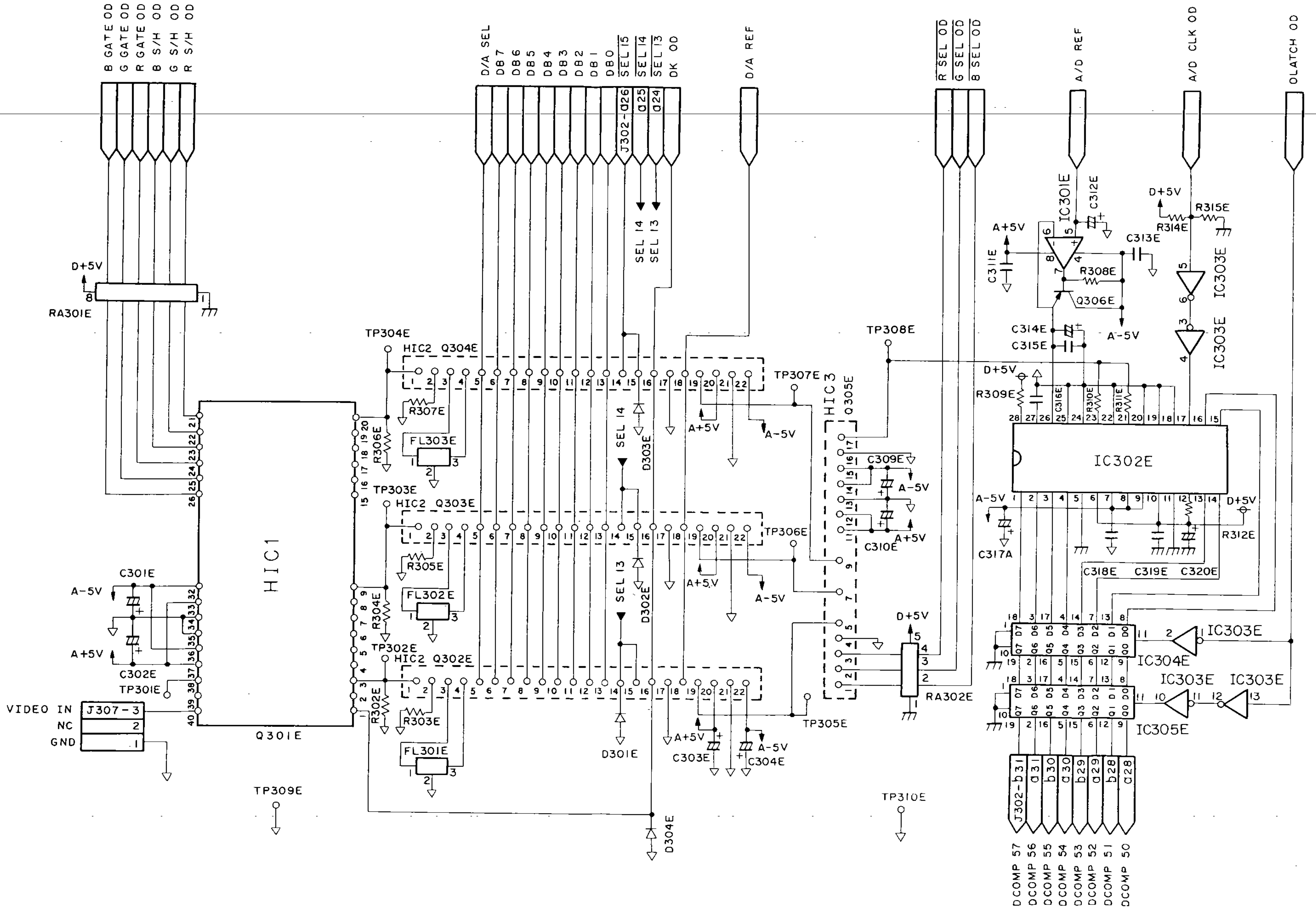
B GATE EV
G GATE EV
R GATE EV
B S/H EV
G S/H EV
R S/H EV
D/A SEL
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SEL6
SEL5
SEL4
DK EV
J301-a32
a31
a30
D/A REF
R SEL EV
G SEL EV
B SEL EV
A/D REF
A/D CLK EV
OLATCH EV
SEL 5
SEL 4
IC301B
C312B
A+5V
C311B
C313B
R308B
Q306B
A-5V
IC303B
C314B
C315B
TP308B
D+5V
R309B
C316B
R310B
R311B
IC302B
C317B
R312B
C318B
C319B
C320B
TP304B
HIC2 Q304B
R307B
FL303B
TP307B
HIC3
Q305B
C309B
C310B
R306B
TP303B
HIC2 Q303B
R305B
FL302B
TP306B
D303B
D302B
HIC1
C301B
C302B
R304B
TP302B
HIC2 Q302B
R303B
FL301B
R302B
TP301B
VIDEO IN
NC
GND
J304-3
Q301B
D301B
C303B
C304B
TP305B
IC304B
IC305B
TP309B
TP310B
J302-b4
a4
b3
a3
b2
a2
b1
a1
DCOMP 27
DCOMP 26
DCOMP 25
DCOMP 24
DCOMP 23
DCOMP 22
DCOMP 21
DCOMP 20

Analog processor circuit diagram (4/6)

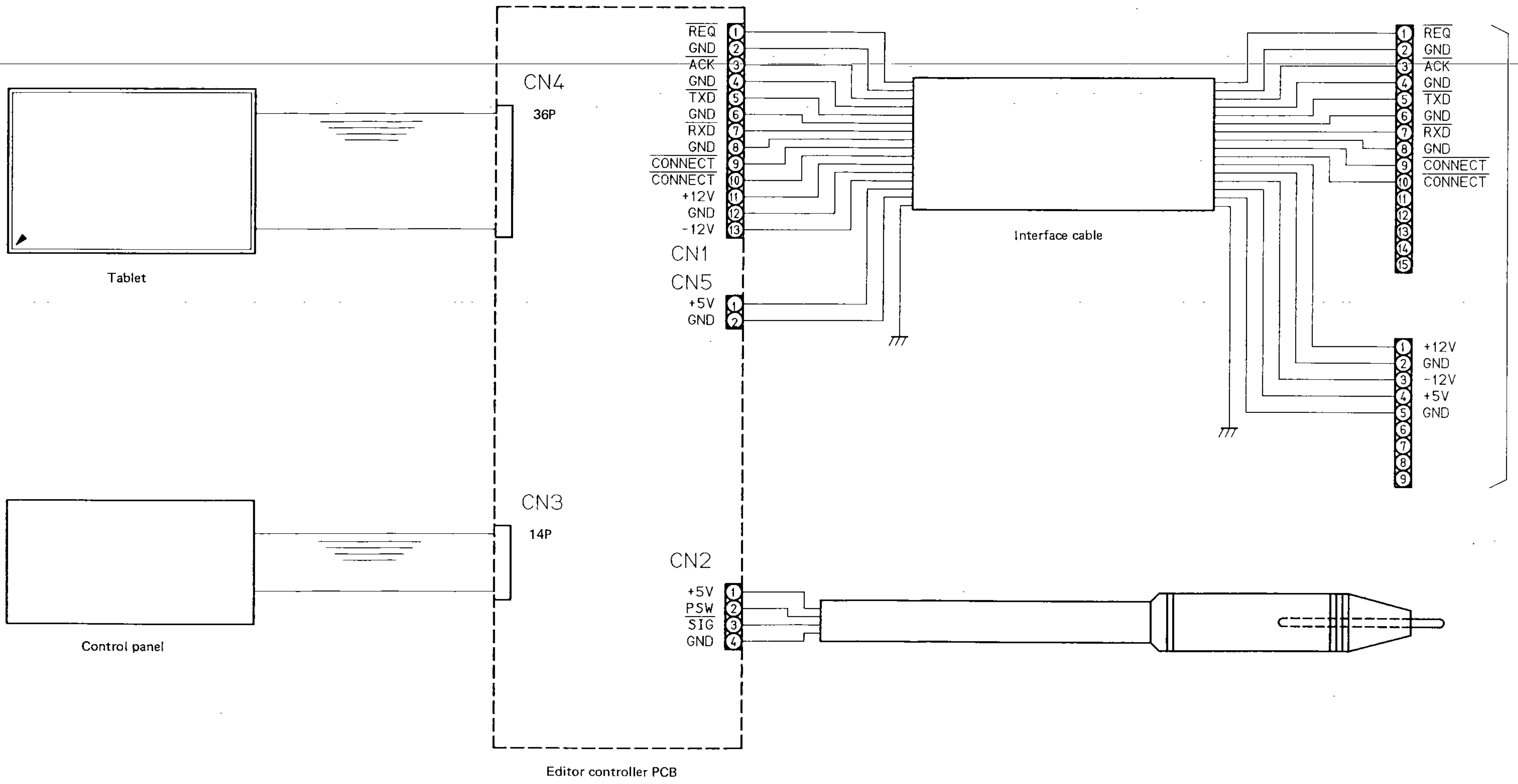

B GATE OD
G GATE OD
R GATE OD
B S/H OD
G S/H OD
R S/H OD
D/A SEL
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SEL 9
SEL 8
SEL 7
DK OD
J302-a8
a7
a6
D/A REF
R SEL OD
G SEL OD
B SEL OD
A/D REF
A/D CLK OD
OLATCH OD
SEL 8
SEL 7
IC301C
C312C
A+5V
C311C
C313C
R308C
Q306C
A-5V
IC303C
C314C
C315C
TP308C
D+5V
R309C
C316C
R310C
R311C
IC302C
TP304C
HIC2 Q304C
R307C
FL303C
R306C
TP303C
HIC2 Q303C
R305C
FL302C
R304C
TP302C
HIC2 Q302C
R303C
FL301C
R302C
HIC1
Q301C
C301C
C302C
TP301C
A-5V
A+5V
VIDEO IN
NC
GND
J305-3
D303C
D302C
D301C
TP307A
TP306C
TP305C
HIC3 Q305C
C309C
C310C
C303C
C304C
A-5V
A+5V
C317C
C318C
C319C
C320C
R312C
IC304C
IC305C
IC303C
TP309C
TP310C
J302-b13
a13
b12
a12
b11
a11
b10
a10
DCOMP 37
DCOMP 36
DCOMP 35
DCOMP 34
DCOMP 33
DCOMP 32
DCOMP 31
DCOMP 30

Analog processor circuit diagram (5/6)


B GATE EV
G GATE EV
R GATE EV
B S/H EV
G S/H EV
R S/H EV
D/A SEL
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SEL 12
SEL 11
SEL 10
DK EV
J302-a17
a16
a15
D/A REF
R SEL EV
G SEL EV
B SEL EV
A/D REF
A/D CLK EV
OLATCH EV
SEL 11
SEL 10
D+5V
RA301D
HIC1
Q301D
C301D
C302D
A-5V
A+5V
TP301D
VIDEO IN
NC
GND
J306-3
TP302D
TP303D
TP304D
TP305D
TP306D
TP307D
TP308D
TP309D
TP310D
HIC2 Q304D
HIC2 Q303D
HIC2 Q302D
R302D
R303D
R304D
R305D
R306D
R307D
FL301D
FL302D
FL303D
D301D
D302D
D303D
D304D
C303D
C304D
HIC3
Q305D
C309D
C310D
RA302D
IC301D
C311D
C312D
C313D
C314D
C315D
C316D
R308D
R309D
R310D
R311D
R312D
Q306D
IC302D
IC303D
IC304D
IC305D
C317D
C318D
C319D
C320D
J302-b22
a22
b21
a21
b20
a20
b19
a19
DCOMP 47
DCOMP 46
DCOMP 45
DCOMP 44
DCOMP 43
DCOMP 42
DCOMP 41
DCOMP 40


B GATE OD
G GATE OD
R GATE OD
B S/H OD
G S/H OD
R S/H OD
D+5V
RA301E
HIC1
Q301E
C301E
C302E
A-5V
A+5V
TP301E
VIDEO IN
NC
GND
J307-3
2
1
TP309E
D/A SEL
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
SEL 15
SEL 14
SEL 13
DK OD
J302-a26
a25
a24
SEL 14
SEL 13
TP304E
HIC2 Q304E
R307E
R306E
FL303E
TP303E
HIC2 Q303E
R305E
R304E
FL302E
TP302E
HIC2 Q302E
R303E
R302E
FL301E
D303E
D302E
D301E
D304E
D/A REF
TP307E
TP306E
TP305E
A+5V
A-5V
C303E
C304E
HIC3 Q305E
C309E
C310E
R SEL OD
G SEL OD
B SEL OD
D+5V
RA302E
TP308E
TP310E
A/D REF
IC301E
C312E
C311E
C313E
R308E
Q306E
C314E
C315E
A/D CLK OD
D+5V
R315E
R314E
IC303E
OLATCH OD
R309E
C316E
R310E
R311E
IC302E
C317A
C318E
C319E
C320E
R312E
IC304E
IC305E
IC303E
IC303E
IC303E
J302-b31
a31
b30
a30
b29
a29
b28
a28
DCOMP 57
DCOMP 56
DCOMP 55
DCOMP 54
DCOMP 53
DCOMP 52
DCOMP 51
DCOMP 50

I. EDITOR GENERAL CIRCUIT DIAGRAM


Tablet
CN4
36P
REQ
GND
ACK
GND
TXD
GND
RXD
GND
CONNECT
CONNECT
+12V
GND
-12V
CN1
CN5
+5V
GND
Interface cable
REQ
GND
ACK
GND
TXD
GND
RXD
GND
CONNECT
CONNECT
+12V
GND
-12V
+5V
GND
To scanner unit
Control panel
CN3
14P
CN2
+5V
PSW
SIG
GND
Editor controller PCB

J. LIST OF SPECIAL TOOLS

There is no special tool for servicing scanner.

K. LIST OF SOLVENTS AND MATERIALS

No.	Material name	Use	Chemical formula, mixture ratio, etc.	Source	Remarks
1.	Ethyl alcohol (Ethanol) Isopropyl alcohol (Isopropanol)	Cleaning: copyboard, glass, mirror, etc.	C_2H_2OH $(CH_3)_2CHOH$	Locally	Flammable. Use in a well-ventilated area. Avoid breathing concentrated vapor.
2.	Lubricating (low viscosity)	Lubrication points	ISO VG 68 oil ESSO Febis K68 MOBIL Vactraoil No.2 SHELL Tonna oil T68	Locally	Equivalent oil can be used. Tool No.: CK-0451 (100cc)

COLOR LASER COPIER
PRINTER

SERVICE
MANUAL

I. SPECIFICATIONS

Type

Copier	Console type

System

Reproduction	Laser beam indirect electrostatic copying
Chargin	Corona
Exposure	Laser beam
Contrast adjustment	Automatic/manual
Development	Dry
Toner replenishment	Manual (600 g container)
Paper feed	Automatic (two cassettes) and manual
Transfer	Corona
Separation	Claw
Cleaning	Blade
Fixing	Two 400W heated rollers

Functions

Warm-up time		8 min. max. (20°C)
First copy (A4/Letter paper)		30s max. (for full color copying)
Continuous copying		Up to 99 sheets
Copying speed		See Table 1-1
Copy size		See Table 1-1
Types of copy paper	Cassette feed	80 g/m² plain paper
	Manual feed	OHP film, thick paper (80 to 104 g/m²)
Two-sided copying		Not possible
Cassette capacity		27 mm loading depth (approx. 250 sheets of 80 g/m² paper)
Copy tray capacity		Approx. 100 sheets of A4/Letter, 80 g/m² paper
Non-image area	Leading-edge blank area	8±2 mm
	Left and right blank area	2±1.5 mm
	Trailing edge blank area	2±1.5 mm

Other

Operating environment	Temperature Humidity Barometric pressure		Refer to Figure 5-1 Refer to Figure 5-1 0.8 to 1 atmosphere
Power supply	Voltage 115V 220V 240V 240V	Frequency 60Hz 50Hz 50Hz 50Hz	Serial number CGL xxxxx DGL xxxxx EGL xxxxx FGL xxxxx
	(Voltage allowable variation, within +10%)		
Power consumption	1.15 kW max. (Printer)		
	1.5 kW max. (Printer + Image scanner)		
Sound level	Image scanner/printer unit: 64 dB (while printing) 50 dB during stand-by (1 m from copier)		
Ozone	0.1 ppM max. (avge. over 8 h)		
Dimensions	930 mm (36.6 in) wide 735 mm (28.9 in) deep 946 mm (37.2 in) high		
Weight	205 kg (450 lb) (Printer only)		

Cassette	Size	Copies/min			
		(four colors)	(three colors)	Two colors (B, G, R)	Single color
A3	A3 (297 × 420 mm)	2.4	3.2	3.8	6.3
A4	A4 (210 × 297 mm)	4.8	6.4	6.4	9.6
B4	B4 (257 × 364 mm)	2.4	3.2	3.8	6.3
A4R	A4 (210 × 297 mm)	2.4	3.2	3.8	6.3
B5R	B5 (182 × 257 mm)	2.4	3.2	3.8	6.3
Ledger	Ledger (279.4 × 431.8 mm)	2.4	3.2	3.8	6.3
Legal	Legal (216 × 356 mm)	2.4	3.2	3.8	6.3
Letter	Letter (216 × 279 mm)	4.8	6.4	6.4	9.6
Letter-R	Letter (216 × 279 mm)	2.4	3.2	3.8	6.3

Table 1-1 Number of copies (sheets/min.)

Copier supplies storage	Paper	Seal copy paper package after opening to protect remaining paper from humidity.
	Toner	Store at under 40°C in a dark place.

Information in this manual is subject to change with improvement or redesign of the copier.

II. LASER BEAM SAFETY

A. Laser Safety

The COLOR LASER COPIER has been approved as Class 1 equipment according to the radiation performance standards issued by the US Department of Health and Human Services (DHHS) in 1968.

This means that the COLOR LASER COPIER does not produce harmful laser beams.

The COLOR LASER COPIER laser scanner is completely enclosed by the protective housing and the external cover, so there is no possibility of laser beam leakage while the user is operating the copier.

B. CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the US Food and Drug Administration issued regulations on equipment using lasers on August 2, 1976.

The regulations apply to all equipment using lasers manufactured after August 1, 1976, and prohibit sale of equipment not complying with them within the United States.

Figure 1-1 shows the label indicating compliance with the CDRH regulations which must be attached to equipment for sale in the United States.

CANON INC.
3-30-2 SHIMOMARUKO, OHTA-KU, TOKYO, JAPAN
CANON U.S.A., INC
ONE CANON PLAZA, LAKE SUCCESS, N.Y. 11042, U.S.A.
CANON CANADA INC.
3245 AMERICAN DRIVE, MISSISSAUGA, ONTARIO
L4V 1N4, CANADA.
MANUFACTURED:
THIS PRODUCT CONFORMS WITH DHHS RADIATION PERFORMANCE STANDARD, 21CFR CHAPTER 1 SUBCHAPTER J.

Figure 1-1

Note: The text may vary in parts for different product models.

C. Laser Unit Operation

Particular care should be taken when performing maintenance around the laser scanner unit to avoid inserting tools, such as screwdrivers, with high reflectance directly into the laser beam path.

Watches, rings, etc., should be removed before beginning operation to avoid the danger of reflecting the laser beam into the eyes.

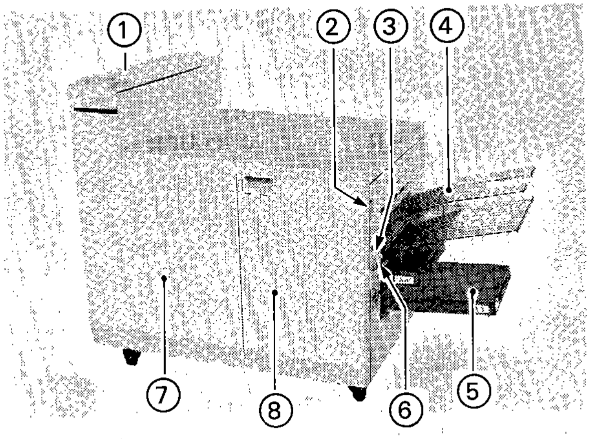
The laser beam is invisible, so special care should be taken when performing maintenance or inspection under the cover to which the following label is attached.

DANGER
Laser invisible radiation
when open.
AVOID DIRECT
EXPOSURE TO BEAM

Figure 1-2

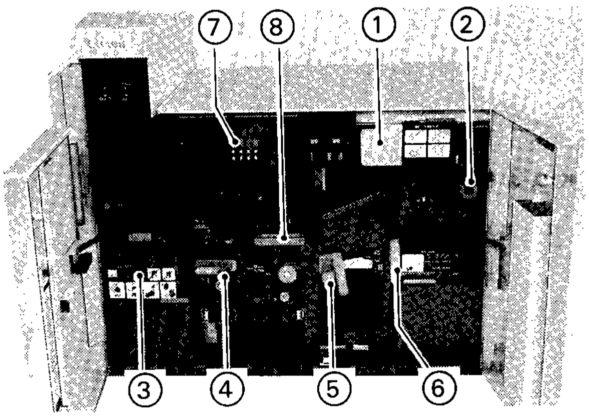
III. PART NAMES

A. External View



① Hopper cover
② Power switch
③ Control key
④ Copy tray
⑤ Cassettes
⑥ Manual feed selector lever
⑦ Left front door
⑧ Right front door

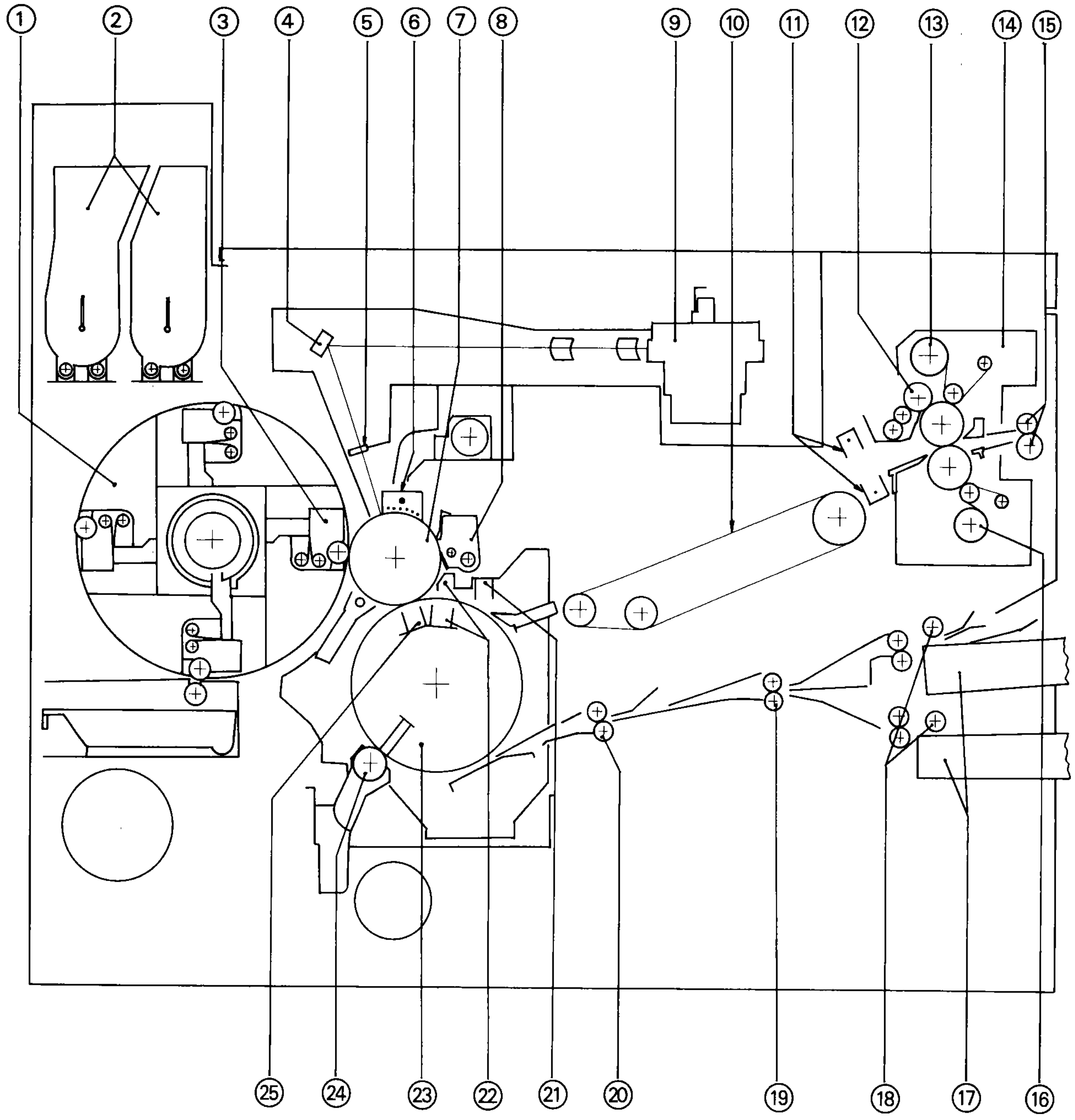
Figure 1-3



① Silicone oil container
② Fixing unit turning knob
③ Waste toner receptacle
④ Transfer drum release lever
⑤ Registration roller release lever
⑥ Waste oil bottle
⑦ Display panel
⑧ Transfer drum release handle

Figure 1-4

B. Cross Section Drawing



① Developing assembly turret	⑩ Feeder	⑲ Feed rollers
② Hoppers	⑪ Pre-fixing corona unit	⑳ Registration rollers
③ Developing unit	⑫ Oil-applying roller	㉑ Separation corona unit
④ Mirror	⑬ Upper-roller cleaning belt	㉒ Static charge eliminating corona
⑤ Dust-proofing glass	⑭ Fixing unit	㉓ Transfer drum
⑥ Primary corona unit	⑮ Delivery rollers	㉔ Cleaning brush
⑦ Photosensitive drum	⑯ Lower-roller cleaning belt	㉕ Transfer corona unit
⑧ Drum cleaning unit	⑰ Cassettes	
⑨ Laser scanner (prism-mirror/motor) unit	⑱ Pick-up rollers	

Figure 1-5

I. IMAGE FORMATION

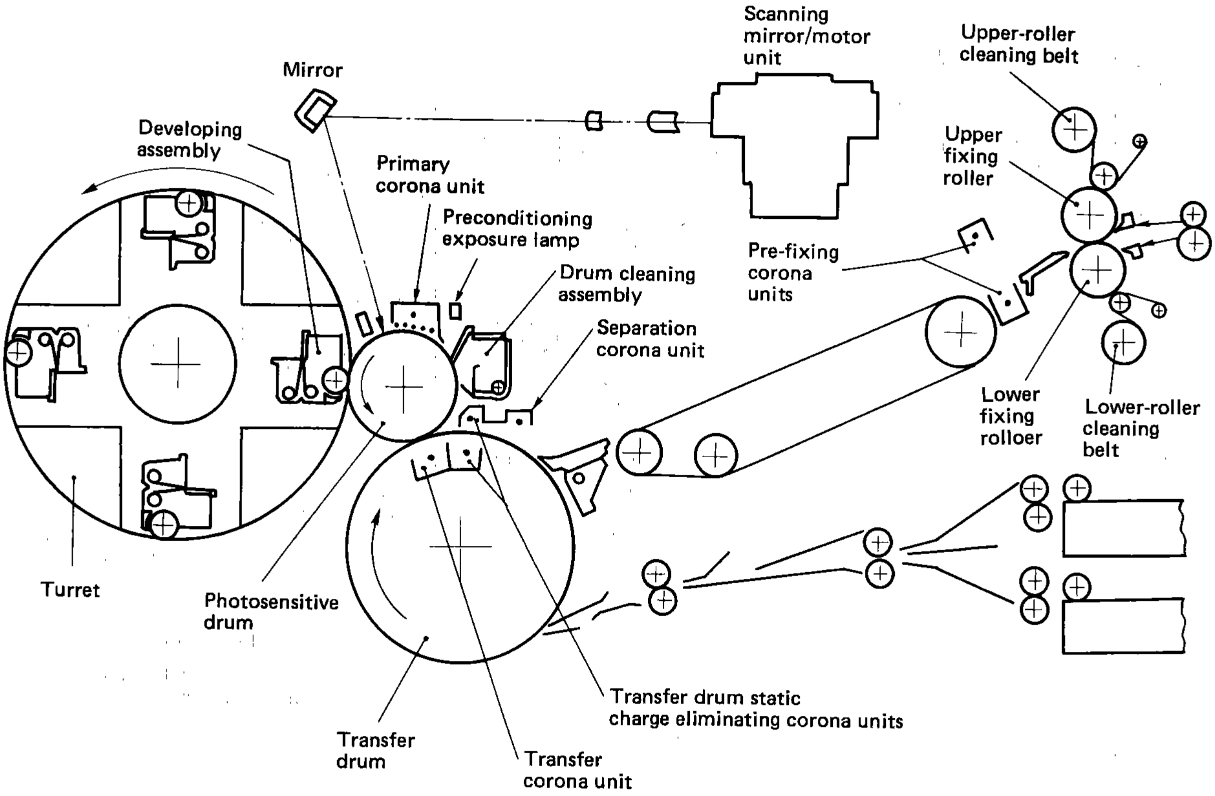

Scanning mirror/motor unit
Upper-roller cleaning belt
Mirror
Developing assembly
Primary corona unit
Upper fixing roller
Preconditioning exposure lamp
Drum cleaning assembly
Pre-fixing corona units
Separation corona unit
Lower fixing rolloer
Lower-roller cleaning belt
Turret
Photosensitive drum
Transfer drum static charge eliminating corona units
Transfer drum
Transfer corona unit

Figure 2-1

The Laser Color Copier uses a seamless photosensitive drum with the construction shown in Figure 2-1.

The external photosensitive layer of the drum is an organic photoconductor (OPC) material, while the core (base cylinder) is conductive aluminum.

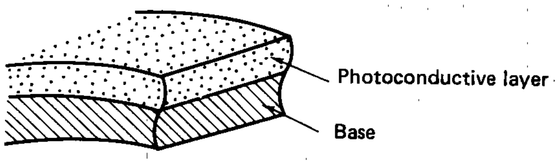

Photoconductive layer
Base

Figure 2-2

The differences between the process of this printer and that of a monochrome printer are described below.

Color documents are exposed to light, and the light reflected from them is separated into the three additive primary colors using color separation filters. The light passing through each filter is sensed by photocells of a charge-coupled device (CCD) unit. The electronic signals (data) from the CCD switch the laser beam ON and OFF as it is repeatedly scanned across the photosensitive drum. The image (areas struck by laser light) is developed using toner of color complementary to the filter (one scan-development cycle per color; up to four times). Each toner image is transferred in turn to the paper and finally fixed to make it permanent.

The copy paper is held by the transfer drum and rotated into contact with the photosensitive drum once for each color of toner deposited on the paper.

The transfer drum is twice the diameter of the photosensitive drum, so the photosensitive drum rotates twice for each time the transfer drum rotates.

The image formation process can be roughly divided into the following seven steps.

Step 1. Pre-conditioning exposure
Step 2. Primary corona (−)
Step 3. Laser exposure
Step 4. Development (AC + DC bias)
Step 5. Transfer (+ corona)
Step 6. Drum cleaning
Step 7. Fixing

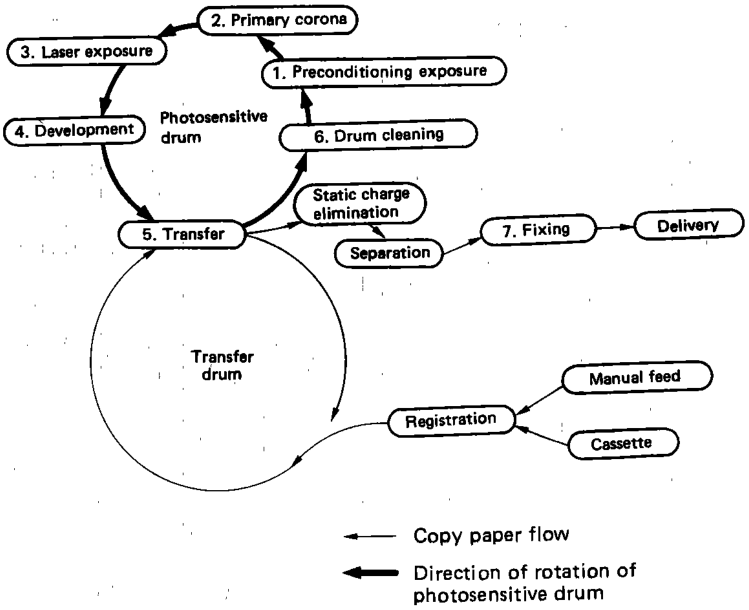

2. Primary corona
3. Laser exposure
1. Preconditioning exposure
4. Development
Photosensitive drum
6. Drum cleaning
Static charge elimination
5. Transfer
7. Fixing
Delivery
Separation
Transfer drum
Manual feed
Registration
Cassette
Copy paper flow
Direction of rotation of photosensitive drum

Figure 2-3

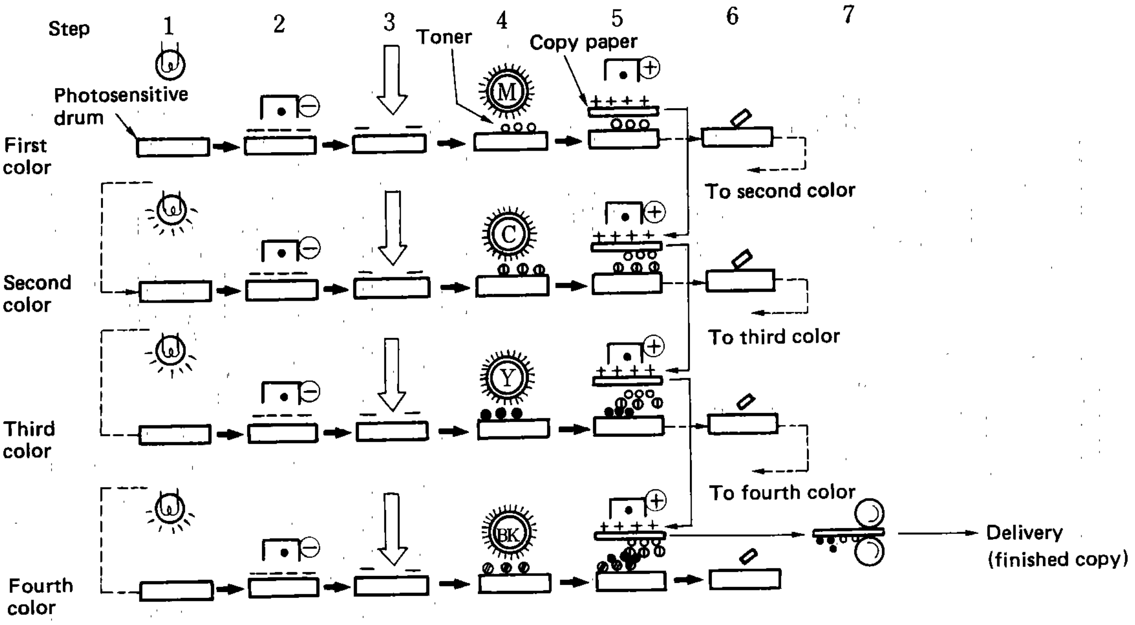

Step
1
2
3
4
5
6
7
Toner
Copy paper
Photosensitive drum
First color
M
To second color
Second color
C
To third color
Third color
Y
To fourth color
Fourth color
BK
Delivery (finished copy)

Figure 2-4

Color images are made using the same basic process used to make black and white copies, as described below.

A. Electrostatic Latent Image Formation Stage

The three steps of this stage. Its final produce a pattern of negative charges on the areas of the photosensitive drum corresponding to white areas of the document, and no negative charges in areas of the drum corresponding to black areas of the document.

The image on the drum formed by the negative charges "latent" is called the electrostatic latent image (because it is invisible).

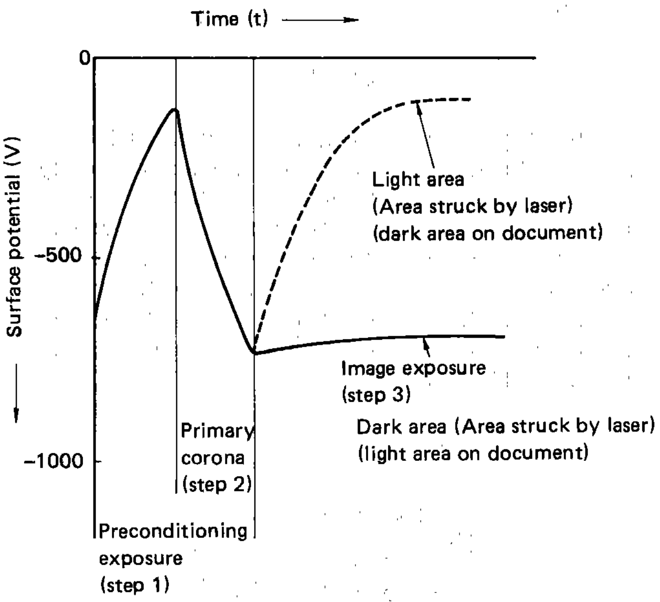


Figure 2-5

Step 1. Preconditioning exposure

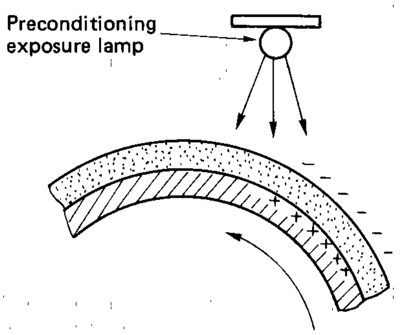


Figure 2-6

As the first step, the photosensitive drum is exposed to light from the pre-conditioning lamp to eliminate any charges remaining on the drum surface. This prevents copy density irregularities.

Step 2. Primary corona

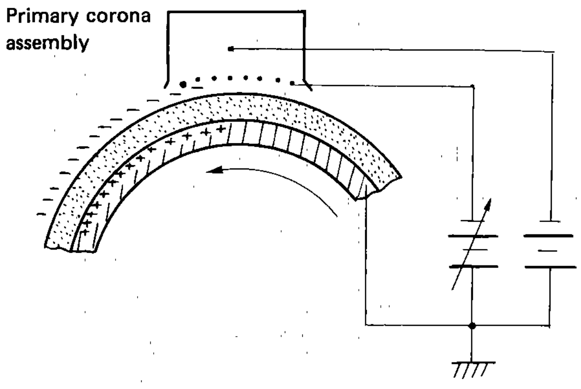


Figure 2-7

The primary corona discharge (negative) produces a uniform negative charge over the entire surface of the drum. This establishes the primary potential.

The drum surface potential is determined by the potential on the grid, so a bias voltage is applied to the grid to maintain a constant drum surface potential.

Step 3. Laser exposure

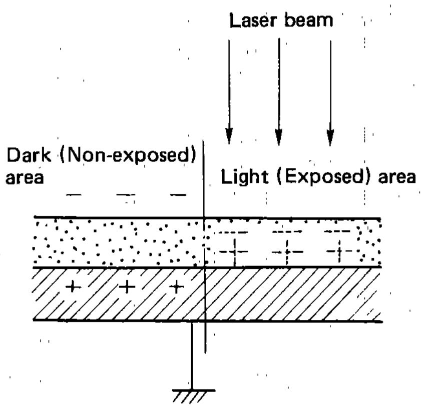


Figure 2-8

The laser beam is directed (scanned) onto the drum surface in areas that should be reproduced as dark (black or color toner). Charges are neutralized where the light strikes, leaving a latent image of zero (or reduced) charge on a background of the original negative charges.

Step 4. Development

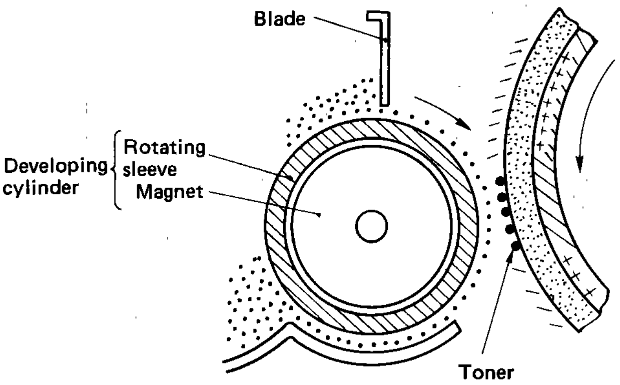


Figure 2-9

Development is the process of turning the electrostatic latent image on the drum surface into a visible image using toner.

In the Color Laser copier, negatively-charged toner is used, the same polarity as the charge applied by the primary corona. For this reason, the toner will be attracted to any area of the drum illuminated by the laser (i.e., it will be attracted to light areas) where the charges have been neutralized.

The developing assembly is shown in Figure 2-9. It consists of a developing cylinder and non-magnetic blade. The developing cylinder consists of a fixed magnet and a sleeve which rotates around it.

The developer consists of toner (main ingredients: resin and coloring agent) and iron power (the carrier) mixed in a fixed ratio.

Friction with the rotating sleeve gives the toner a negative charge and the iron powder a positive charge.

The developer forms a "brush" on the sleeve due to the field of the fixed magnet, and is skimmed to a layer of uniform thickness by the blade.

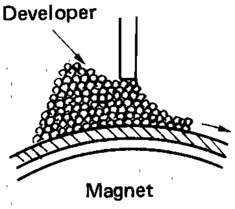


Figure 2-10

Both AC and DC bias voltage (negative component) are applied simultaneously to the developing cylinder (developing bias). The DC bias is negative, so the negative excursion of the waveform is greater than the positive.

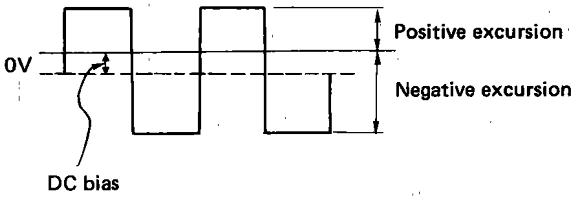


Figure 2-11

During development, toner is attracted to areas of the drum struck by the laser beam by the combined effect of the drum surface potential and the negative component of the developing bias. Excess toner is removed from the exposed areas of the drum, and all toner is removed from non-exposed areas by the positive component of the developing bias and charges on the drum surface.

Step 5. Transfer

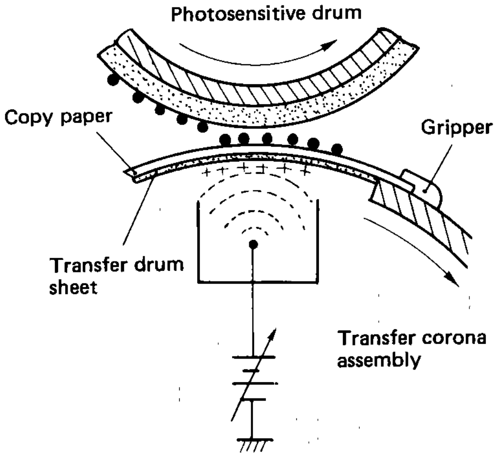


Figure 2-12

The sheet of paper onto which toner is to be transferred to make a copy is first wrapped around the transfer drum, held in place by grippers. (No image is formed on the first 8mm of the copy leading edge.) The area under the paper is an insulating sheet, and a corona unit inside the transfer drum applies a positive charge to the back of the sheet.

The charges attract toner from the photosensitive drum to the paper, and also hold the paper firmly to the transfer drum.

Step 6. Drum cleaning

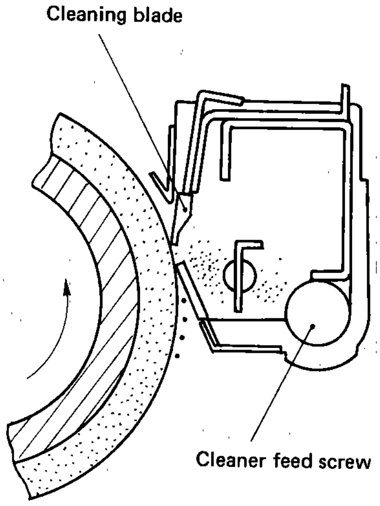

Cleaning blade
Cleaner feed screw

Figure 2-13

To leave the drum surface clean for the next copy, any toner remaining on the surface after transfer is removed by the cleaning blade and collected by the sweeper strip and conveyed toward the front by the cleaner feed screw to the waste toner receptacle.

Step 7. Fixing

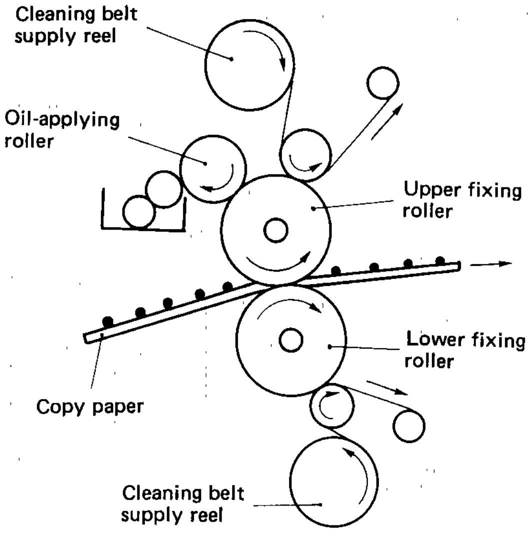

Cleaning belt supply reel
Oil-applying roller
Upper fixing roller
Lower fixing roller
Copy paper
Cleaning belt supply reel

Figure 2-14

After all toner-transfer operations, the copy paper is sent to the fixing assembly.

The copy paper is heated and pressed as it passes between the two fixing rollers. The toner on the copy paper (up to four colors) is melted and mixed to reproduce the original colors, and pressed firmly onto the paper to make a permanent copy.

Silicone oil is applied periodically to the upper fixing roller to prevent toner from sticking to them (offsetting) as a copy passes through. Both fixing rollers are cleaned by contact with a cleaning belt impregnated with silicone oil. The belt is advanced slowly by the winding mechanism.

II. AUXILIARY PROCESSES

A. Static Charge Eliminators

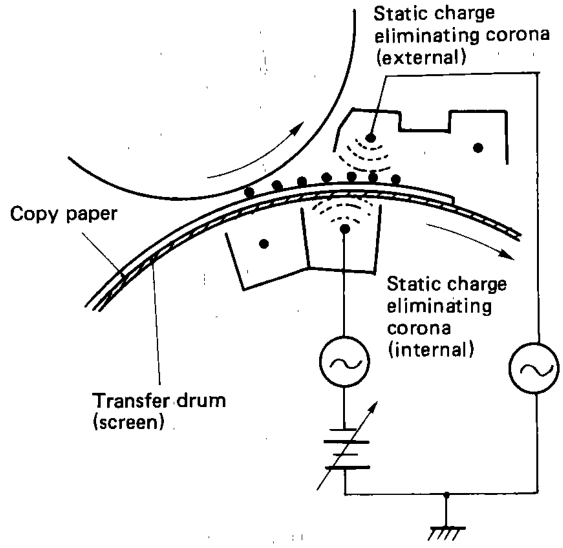

Static charge eliminating corona (external)
Copy paper
Static charge eliminating corona (internal)
Transfer drum (screen)

Figure 2-15

Charges remaining on the front of the copy paper after transfer are eliminated by an AC corona to stabilize the toner image. (The toner particles are loose on the paper, and a sudden discharge of residual toner would likely scatter toner at random.)

The internal static charge eliminating corona (AC corona with negative DC component) neutralizes the positive charges that were applied to the back of the sheet of the transfer drum by the transfer corona.

B. Separation Corona Unit

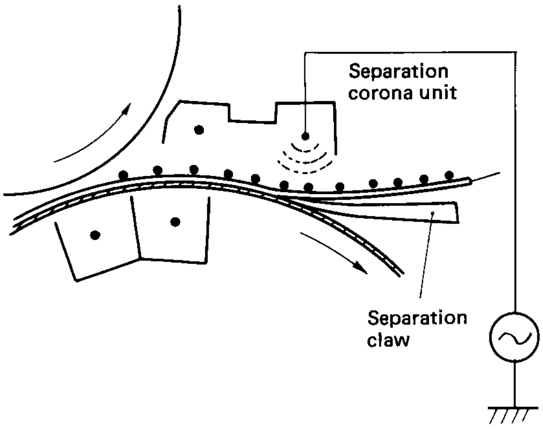

Separation corona unit
Separation claw

Figure 2-16

A separation claw separates the copy paper from the transfer drum. However, the copy paper is held to the transfer drum by electrostatic attraction. An AC corona neutralizes the charges and enable easy removal of the copy paper from the transfer drum.

C. Pre-fixing Corona Units

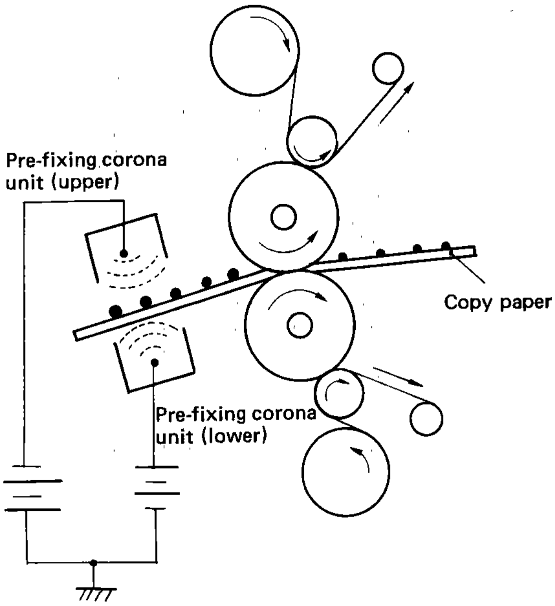

Pre-fixing corona unit (upper)
Copy paper
Pre-fixing corona unit (lower)

Figure 2-17

Prior to fixing, a negative corona discharge onto the front of the copy paper and a positive corona onto the back prevents the toner on the paper from moving around due to residual charges. Up to four layers of toner can be deposited onto the copy paper. Without these coronas the toner could easily move around (out of position) when the paper reached the fixing rollers, which would seriously distort the image.

D. Ozone Filter

There is a catalytic filter in the exhaust fan unit which decomposes the ozone produced by corona discharge and prevents it from escaping from the copier.

Notes on color copying:
The principles of making a color copy are the same as those for a black and white copy, except that the drum is scanned by the laser once for each color of toner, and the process through development and transfer is completed for one color before the laser scan for the next color.

III. LIMITATIONS

A. Introduction

There are many difficulties in making high-quality color prints by an electrophotographic process, some of which are discussed below. The Color Laser copier has many design features to minimize these problems, and they are very successful. However, the prints are not of the same quality as those in high-quality printed material, such as magazine illustrations and in photographs. Each product has its own advantages and limitations, and users of the copier should be made aware of the capabilities of the machine.

B. Problems

1. Variation in OPC sensitivity

The sensitivity of the OPC used for the photosensitive drum varies with the environmental conditions, and deteriorates over time.

2. Distribution of spectral reflectance of toner

The three toners (yellow, magenta, and cyan) each completely absorb the spectra of their respective complementary colors. They are supposed to completely reflect any other colors, but, in actuality, their reflectance is not ideal.

3. Reproducibility of gradations by dry electrophotography

As Figure 2-18 shows, the characteristics of the material used for the photosensitive drum and the properties of the toner are such that it is not possible to reproduce exactly the same density gradations as in the original. This is shown in Figure 2-18.

Also, since the toner is a powder, images smaller than the size of a toner particle cannot be reproduced.

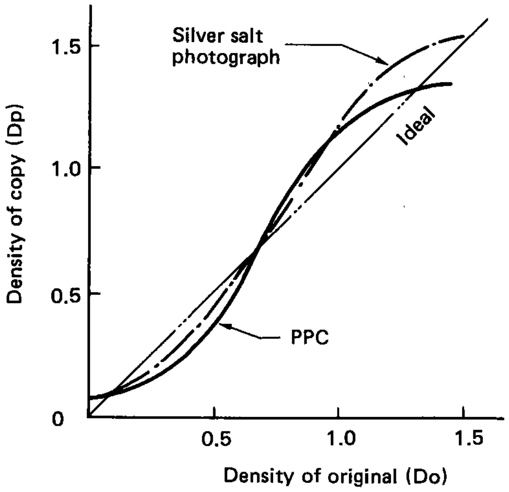


Figure 2-18

I. BASIC OPERATIONS

A. Functional Units

Operations can be divided into the functions of three major systems: paper feed and delivery, image formation, and control systems.

The Image Scanner is connected to the printer by a cable.

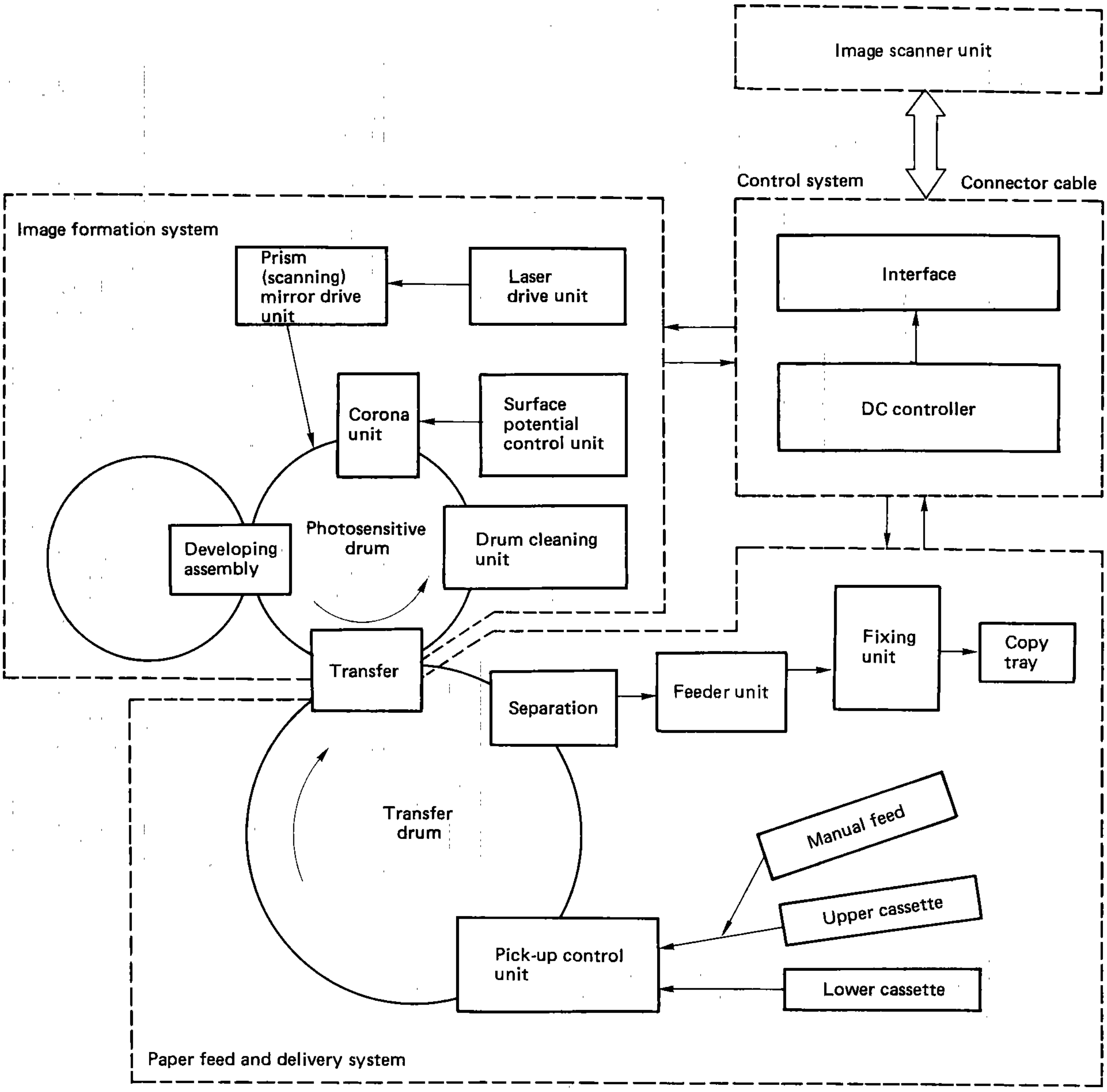


Image scanner unit
Control system
Connector cable
Interface
DC controller
Image formation system
Prism (scanning) mirror drive unit
Laser drive unit
Corona unit
Surface potential control unit
Photosensitive drum
Developing assembly
Drum cleaning unit
Transfer
Separation
Feeder unit
Fixing unit
Copy tray
Transfer drum
Manual feed
Upper cassette
Lower cassette
Pick-up control unit
Paper feed and delivery system

Figure 3-1

B. Electrical Circuits

The principal electrical functions of the printer are controlled by a microprocessor on the DC controller PCB.

As directed by software in the memory of the microprocessor, input signals from sensors, operation keys, or other PCBs are read in, and the necessary control signals are outputted to drive loads such as motors, solenoids, and lamps, or to circuits on other PCBs at the appropriate times.

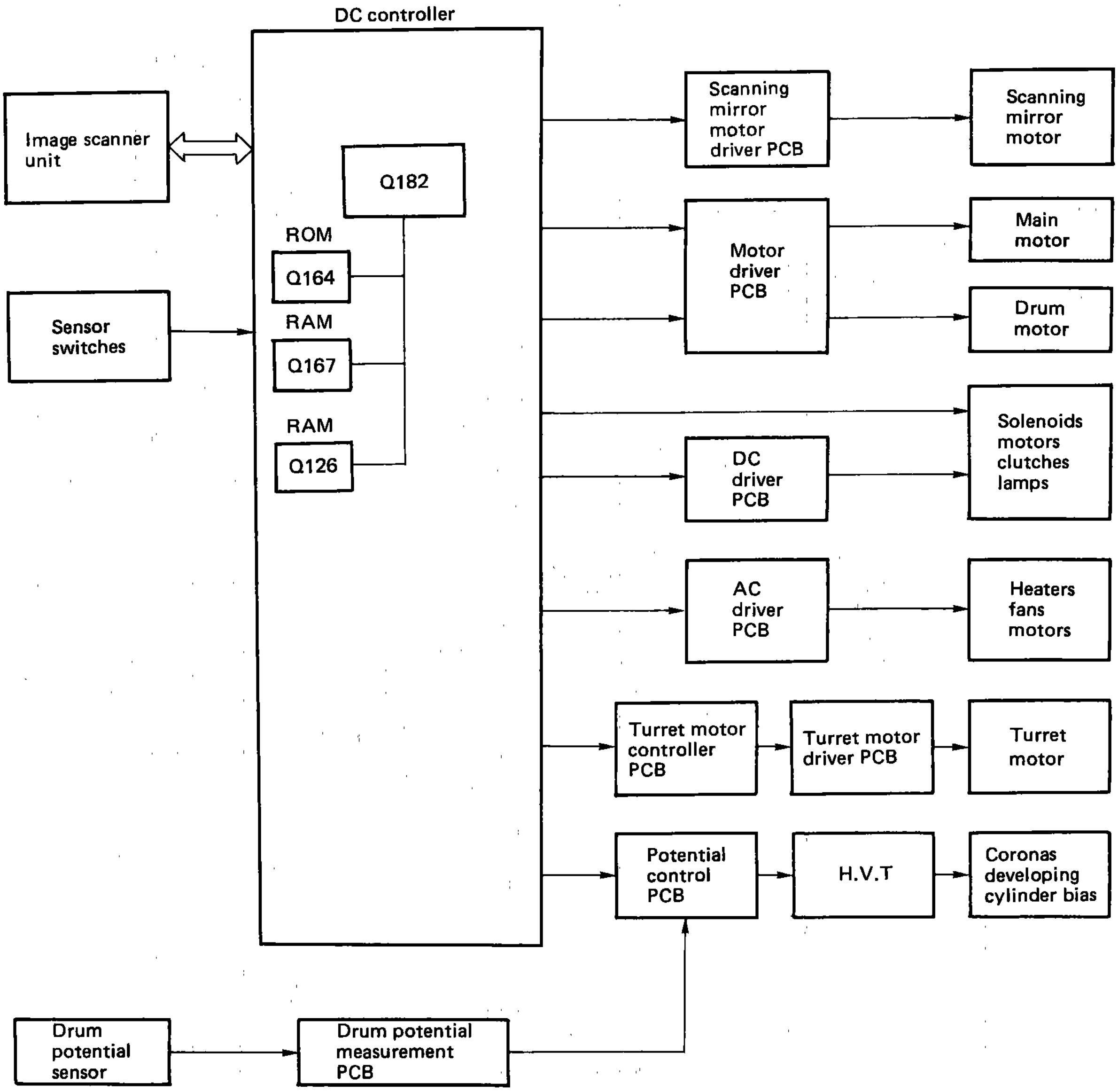
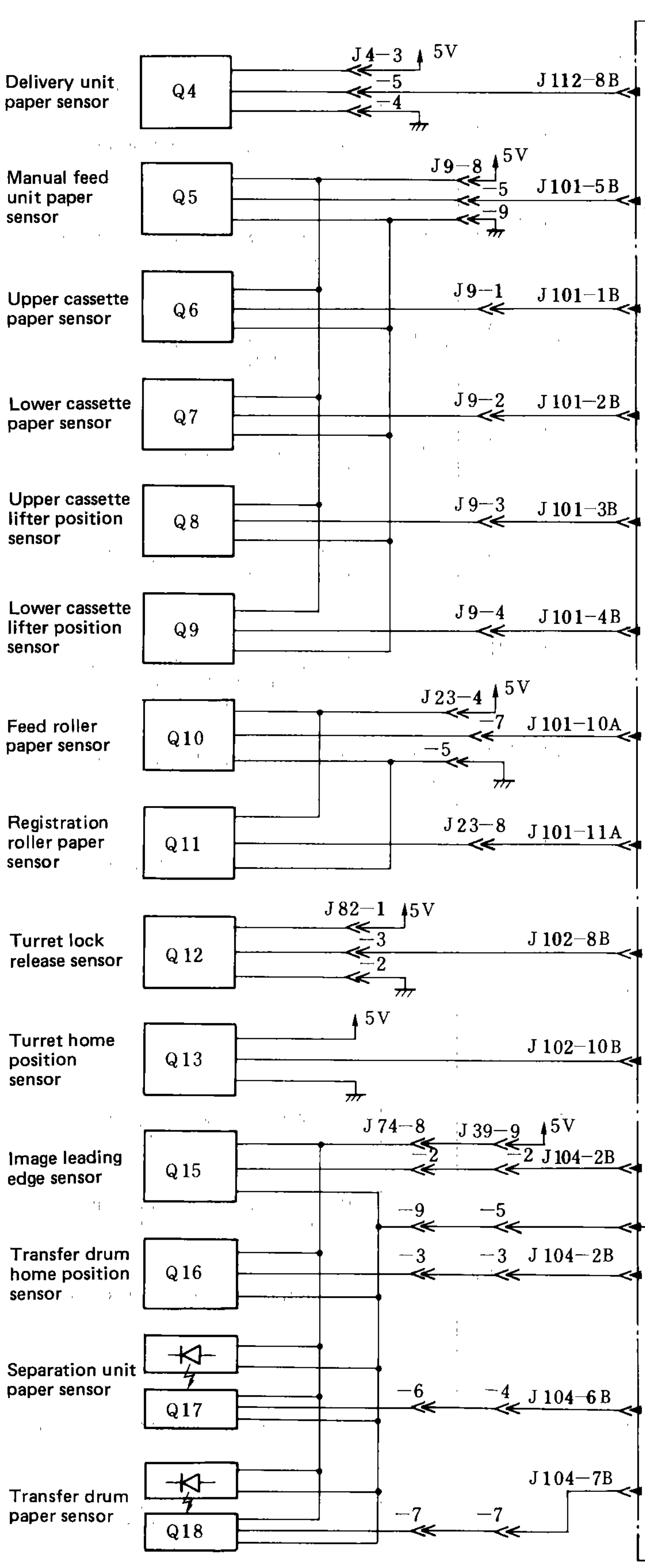

DC controller
Image scanner unit
Sensor switches
Q182
ROM
Q164
RAM
Q167
RAM
Q126
Scanning mirror motor driver PCB
Scanning mirror motor
Motor driver PCB
Main motor
Drum motor
Solenoids motors clutches lamps
DC driver PCB
AC driver PCB
Heaters fans motors
Turret motor controller PCB
Turret motor driver PCB
Turret motor
Potential control PCB
H.V.T
Coronas developing cylinder bias
Drum potential sensor
Drum potential measurement PCB

Figure 3-2

C. DC Controller Inputs

DC controller inputs 1


DC controller PCB
Delivery unit paper sensor
Q4
J4−3
5V
−5
−4
J112−8B
Manual feed unit paper sensor
Q5
J9−8
5V
−5
−9
J101−5B
Upper cassette paper sensor
Q6
J9−1
J101−1B
Lower cassette paper sensor
Q7
J9−2
J101−2B
Upper cassette lifter position sensor
Q8
J9−3
J101−3B
Lower cassette lifter position sensor
Q9
J9−4
J101−4B
Feed roller paper sensor
Q10
J23−4
5V
−7
−5
J101−10A
Registration roller paper sensor
Q11
J23−8
J101−11A
Turret lock release sensor
Q12
J82−1
5V
−3
−2
J102−8B
Turret home position sensor
Q13
5V
J102−10B
Image leading edge sensor
Q15
J74−8
J39−9
5V
−2
−2
J104−2B
−9
−5
Transfer drum home position sensor
Q16
−3
−3
J104−2B
Separation unit paper sensor
Q17
−6
−4
J104−6B
Transfer drum paper sensor
Q18
J104−7B
−7
−7

$\overline{\text{PDP5}}$	"0" when Q4 senses paper (when the light-blocking plate is not in Q4)
MFS	"1" when manual feed mode is selected (when the light-blocking plate is in Q5)
$\overline{\text{UPEP}}$	"0" when there is no paper in the upper cassette (when the light-blocking plate is not in Q6)
$\overline{\text{LPEP}}$	"0" when there is no paper in the lower cassette (when the light-blocking plate is not in Q7)
ULFTP	"1" when the upper cassette lifter is raised (when the light-blocking plate is not in Q8)
LLFTP	"1" when the lower cassette lifter is raised (when the light-blocking plate is not in Q9)
PDP1	"1" when Q10 senses paper (when the light-blocking plate is in Q10)
PDP2	"1" when Q11 senses paper (when the light-blocking plate is in Q11)
$\overline{\text{RLR}}$	"0" when Q12 senses releaseed lock (when the light-blocking plate is not in Q12)
RHP	"1" when the turret is at the home position (when the light-blocking plate is in Q13)
$\overline{\text{ILEG}}$	"0" when the light-blocking plate is in Q15
$\overline{\text{TDHP}}$	"0" when the transfer drum is at the home position (when the light-blocking plate is in Q16)
PDP4	"1" when Q17 senses paper
PDP3	"1" when Q18 senses paper

Figure 3-3

DC controller inputs 2

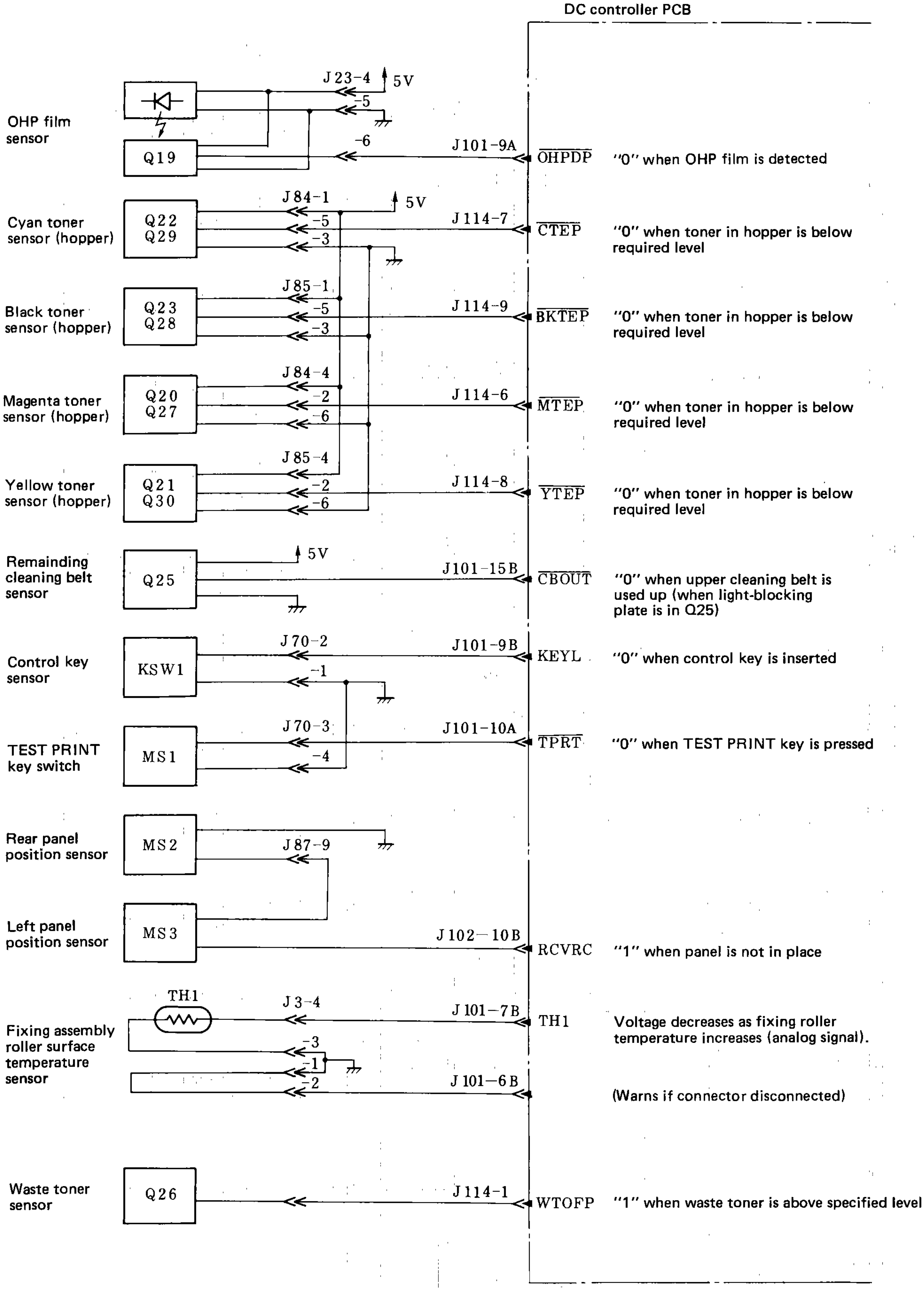

DC controller PCB
OHP film sensor
Q19
J23-4
5V
-5
-6
J101-9A
OHPDP
"0" when OHP film is detected
Cyan toner sensor (hopper)
Q22
Q29
J84-1
-5
-3
5V
J114-7
CTEP
"0" when toner in hopper is below required level
Black toner sensor (hopper)
Q23
Q28
J85-1
-5
-3
J114-9
BKTEP
"0" when toner in hopper is below required level
Magenta toner sensor (hopper)
Q20
Q27
J84-4
-2
-6
J114-6
MTEP
"0" when toner in hopper is below required level
Yellow toner sensor (hopper)
Q21
Q30
J85-4
-2
-6
J114-8
YTEP
"0" when toner in hopper is below required level
Remainding cleaning belt sensor
Q25
5V
J101-15B
CBOUT
"0" when upper cleaning belt is used up (when light-blocking plate is in Q25)
Control key sensor
KSW1
J70-2
-1
J101-9B
KEYL
"0" when control key is inserted
TEST PRINT key switch
MS1
J70-3
-4
J101-10A
TPRT
"0" when TEST PRINT key is pressed
Rear panel position sensor
MS2
J87-9
Left panel position sensor
MS3
J102-10B
RCVRC
"1" when panel is not in place
TH1
Fixing assembly roller surface temperature sensor
J3-4
-3
-1
-2
J101-7B
J101-6B
TH1
Voltage decreases as fixing roller temperature increases (analog signal).
(Warns if connector disconnected)
Waste toner sensor
Q26
J114-1
WTOFP
"1" when waste toner is above specified level

Figure 3-4

DC controller inputs 3

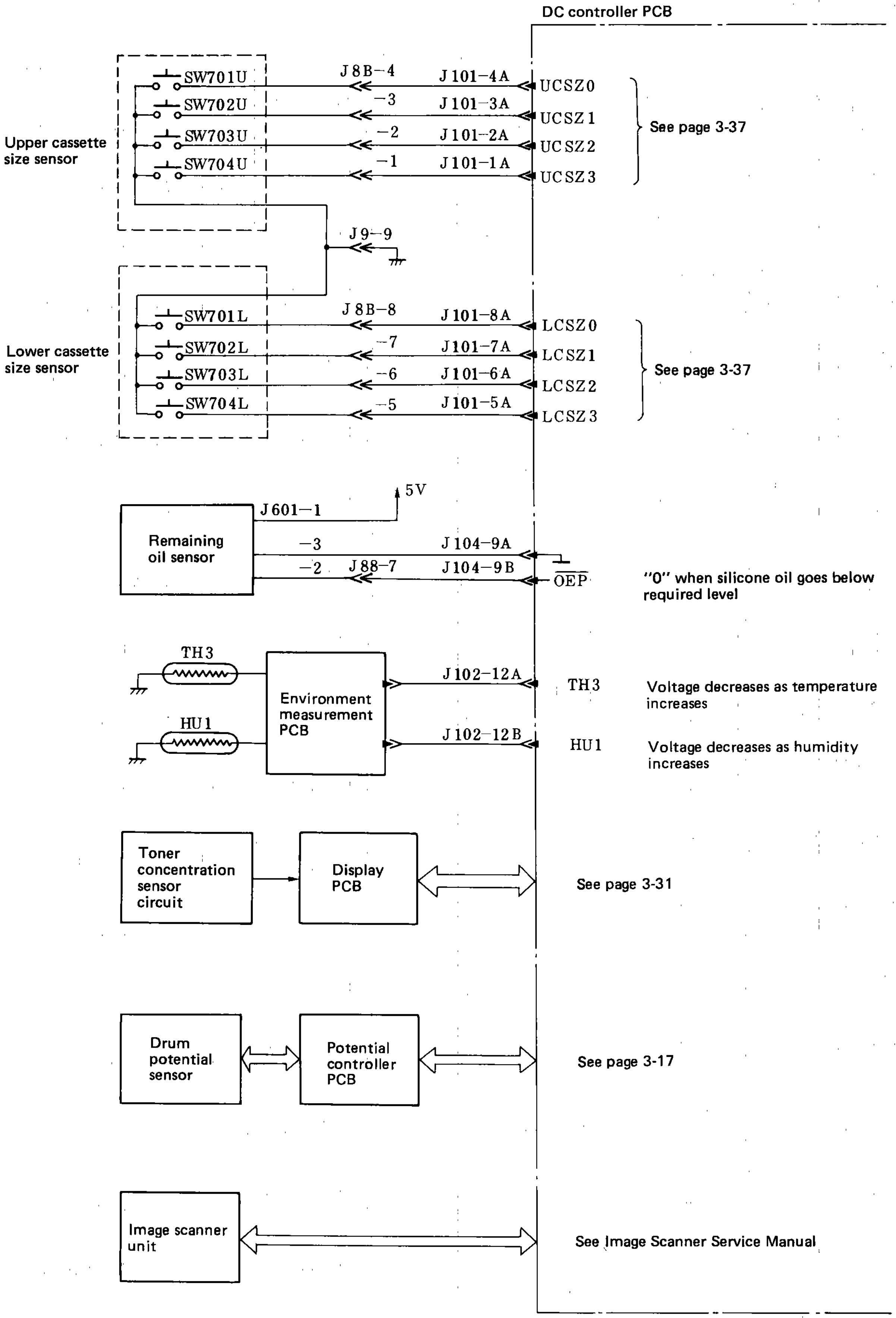

DC controller PCB
Upper cassette size sensor
SW701U
SW702U
SW703U
SW704U
J8B-4
-3
-2
-1
J101-4A
J101-3A
J101-2A
J101-1A
UCSZ0
UCSZ1
UCSZ2
UCSZ3
See page 3-37
J9-9
Lower cassette size sensor
SW701L
SW702L
SW703L
SW704L
J8B-8
-7
-6
-5
J101-8A
J101-7A
J101-6A
J101-5A
LCSZ0
LCSZ1
LCSZ2
LCSZ3
See page 3-37
5V
J601-1
Remaining oil sensor
-3
-2
J88-7
J104-9A
J104-9B
OEP
"0" when silicone oil goes below required level
TH3
HU1
Environment measurement PCB
J102-12A
J102-12B
TH3
Voltage decreases as temperature increases
HU1
Voltage decreases as humidity increases
Toner concentration sensor circuit
Display PCB
See page 3-31
Drum potential sensor
Potential controller PCB
See page 3-17
Image scanner unit
See Image Scanner Service Manual

Figure 3-5

D. DC Controller Outputs

DC controller outputs 1

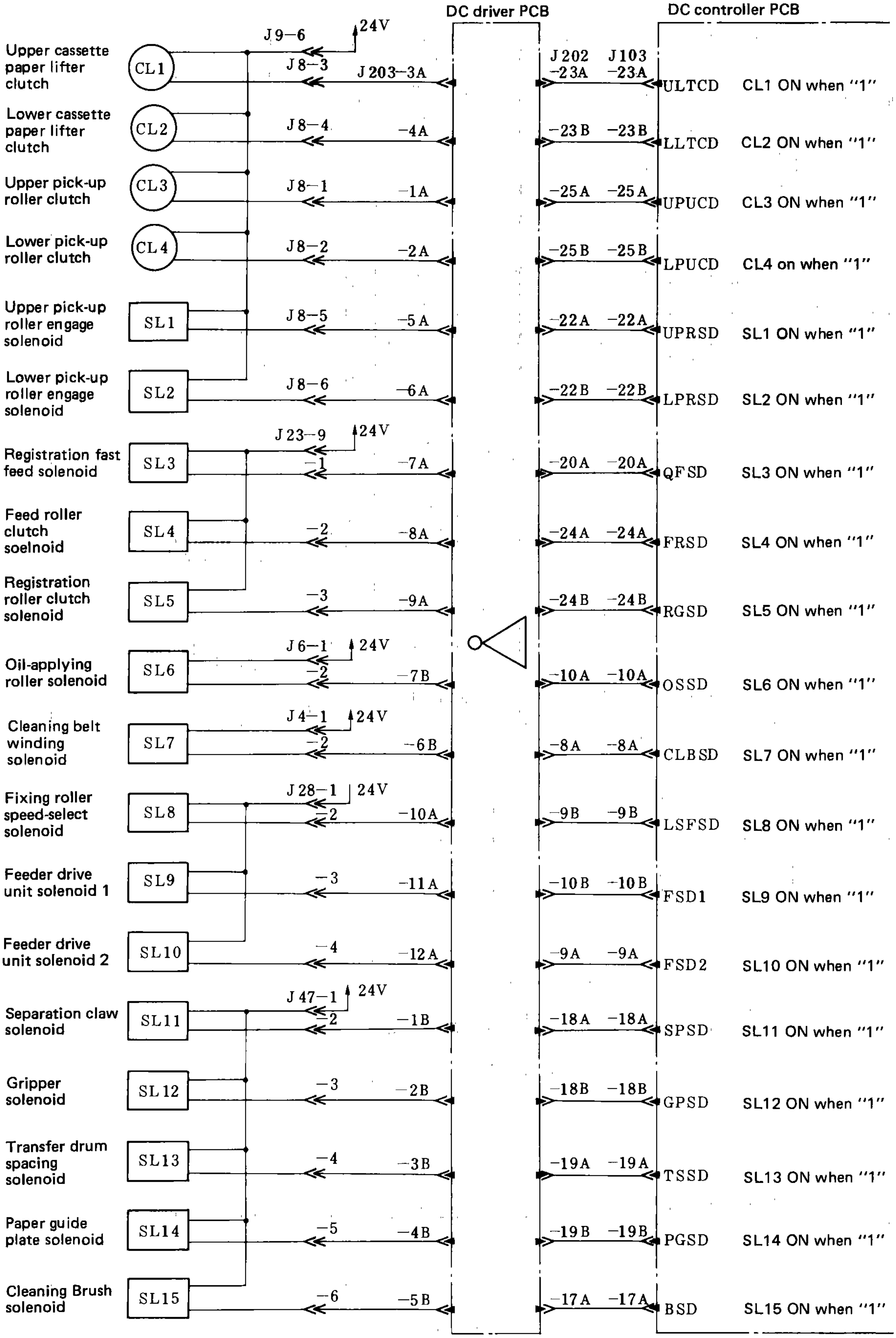

DC driver PCB
DC controller PCB
Upper cassette paper lifter clutch
CL1
J9–6
24V
J8–3
J203–3A
J202 –23A
J103 –23A
ULTCD
CL1 ON when "1"
Lower cassette paper lifter clutch
CL2
J8–4
–4A
–23B
–23B
LLTCD
CL2 ON when "1"
Upper pick-up roller clutch
CL3
J8–1
–1A
–25A
–25A
UPUCD
CL3 ON when "1"
Lower pick-up roller clutch
CL4
J8–2
–2A
–25B
–25B
LPUCD
CL4 on when "1"
Upper pick-up roller engage solenoid
SL1
J8–5
–5A
–22A
–22A
UPRSD
SL1 ON when "1"
Lower pick-up roller engage solenoid
SL2
J8–6
–6A
–22B
–22B
LPRSD
SL2 ON when "1"
J23–9
24V
Registration fast feed solenoid
SL3
–1
–7A
–20A
–20A
QFSD
SL3 ON when "1"
Feed roller clutch soelnoid
SL4
–2
–8A
–24A
–24A
FRSD
SL4 ON when "1"
Registration roller clutch solenoid
SL5
–3
–9A
–24B
–24B
RGSD
SL5 ON when "1"
J6–1
24V
Oil-applying roller solenoid
SL6
–2
–7B
–10A
–10A
OSSD
SL6 ON when "1"
J4–1
24V
Cleaning belt winding solenoid
SL7
–2
–6B
–8A
–8A
CLBSD
SL7 ON when "1"
J28–1
24V
Fixing roller speed-select solenoid
SL8
–2
–10A
–9B
–9B
LSFSD
SL8 ON when "1"
Feeder drive unit solenoid 1
SL9
–3
–11A
–10B
–10B
FSD1
SL9 ON when "1"
Feeder drive unit solenoid 2
SL10
–4
–12A
–9A
–9A
FSD2
SL10 ON when "1"
J47–1
24V
Separation claw solenoid
SL11
–2
–1B
–18A
–18A
SPSD
SL11 ON when "1"
Gripper solenoid
SL12
–3
–2B
–18B
–18B
GPSD
SL12 ON when "1"
Transfer drum spacing solenoid
SL13
–4
–3B
–19A
–19A
TSSD
SL13 ON when "1"
Paper guide plate solenoid
SL14
–5
–4B
–19B
–19B
PGSD
SL14 ON when "1"
Cleaning Brush solenoid
SL15
–6
–5B
–17A
–17A
BSD
SL15 ON when "1"

Figure 3-6

DC controller outputs 2

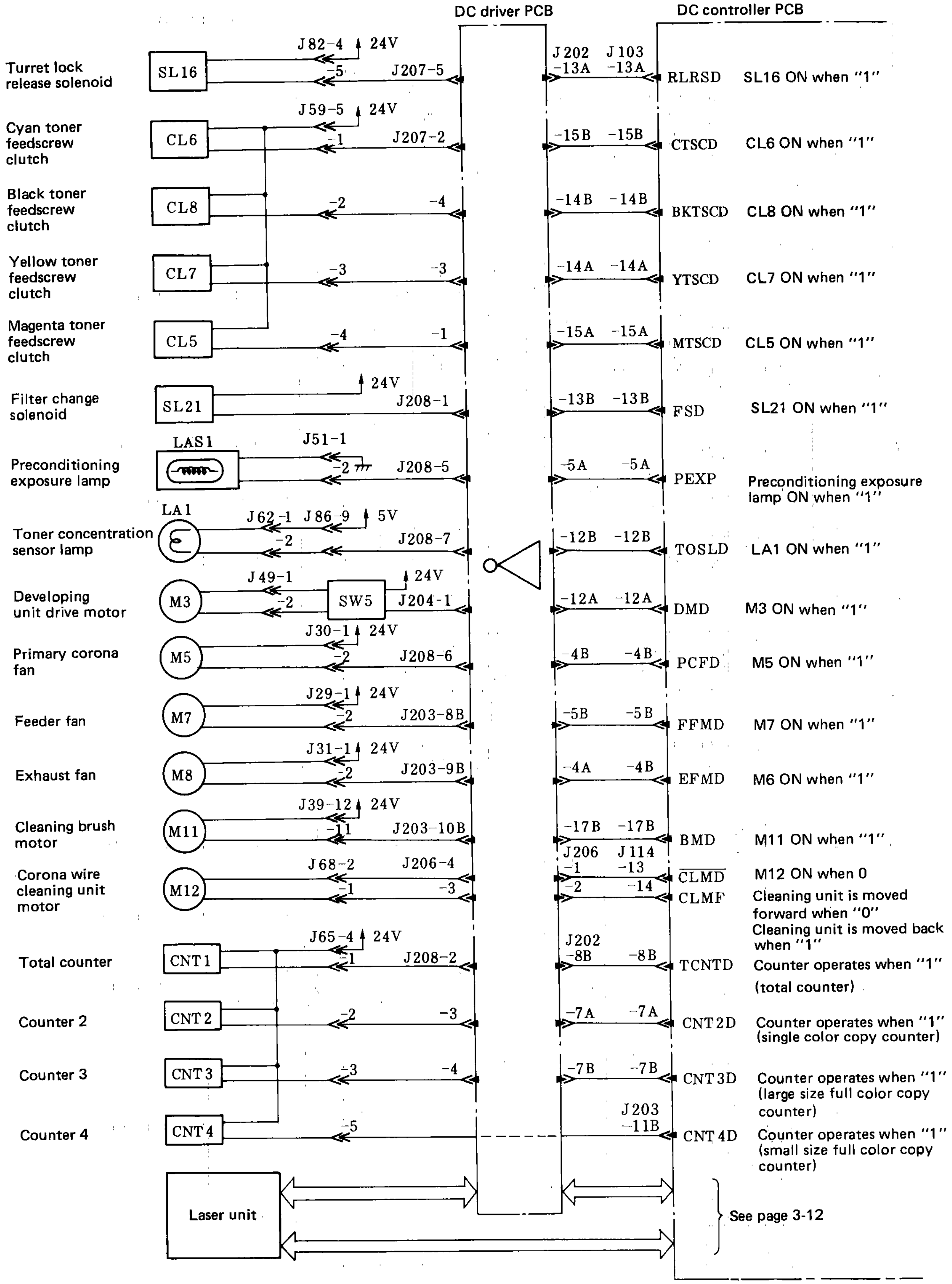
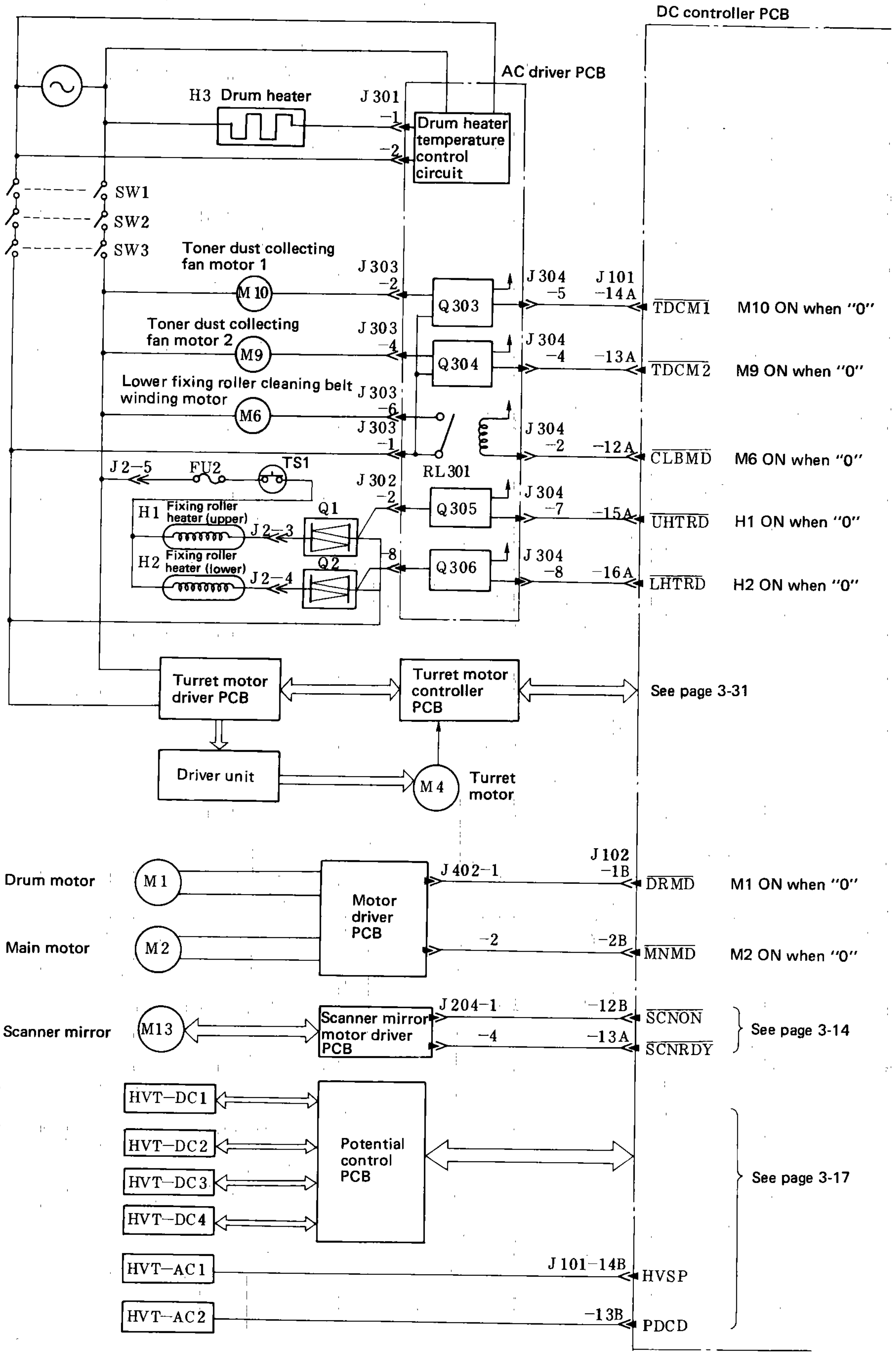

DC driver PCB
DC controller PCB
Turret lock release solenoid
SL16
J82-4 24V
-5 J207-5
J202 J103
-13A -13A
RLRSD
SL16 ON when "1"
Cyan toner feedscrew clutch
CL6
J59-5 24V
-1 J207-2
-15B -15B
CTSCD
CL6 ON when "1"
Black toner feedscrew clutch
CL8
-2 -4
-14B -14B
BKTSCD
CL8 ON when "1"
Yellow toner feedscrew clutch
CL7
-3 -3
-14A -14A
YTSCD
CL7 ON when "1"
Magenta toner feedscrew clutch
CL5
-4 -1
-15A -15A
MTSCD
CL5 ON when "1"
Filter change solenoid
SL21
24V
J208-1
-13B -13B
FSD
SL21 ON when "1"
Preconditioning exposure lamp
LAS1
J51-1
-2 J208-5
-5A -5A
PEXP
Preconditioning exposure lamp ON when "1"
Toner concentration sensor lamp
LA1
J62-1 J86-9 5V
-2 J208-7
-12B -12B
TOSLD
LA1 ON when "1"
Developing unit drive motor
M3
J49-1
-2
SW5
24V
J204-1
-12A -12A
DMD
M3 ON when "1"
Primary corona fan
M5
J30-1 24V
-2 J208-6
-4B -4B
PCFD
M5 ON when "1"
Feeder fan
M7
J29-1 24V
-2 J203-8B
-5B -5B
FFMD
M7 ON when "1"
Exhaust fan
M8
J31-1 24V
-2 J203-9B
-4A -4B
EFMD
M6 ON when "1"
Cleaning brush motor
M11
J39-12 24V
-11 J203-10B
-17B -17B
BMD
M11 ON when "1"
Corona wire cleaning unit motor
M12
J68-2 J206-4
-1 -3
J206 J114
-1 -13
-2 -14
CLMD
CLMF
M12 ON when 0
Cleaning unit is moved forward when "0"
Cleaning unit is moved back when "1"
Total counter
CNT1
J65-4 24V
-1 J208-2
J202
-8B -8B
TCNTD
Counter operates when "1" (total counter)
Counter 2
CNT2
-2 -3
-7A -7A
CNT2D
Counter operates when "1" (single color copy counter)
Counter 3
CNT3
-3 -4
-7B -7B
CNT3D
Counter operates when "1" (large size full color copy counter)
Counter 4
CNT4
-5
J203
-11B
CNT4D
Counter operates when "1" (small size full color copy counter)
Laser unit
See page 3-12

Figure 3-7

DC controller outputs 3



DC controller PCB
AC driver PCB
H3 Drum heater
J 301
-1
-2
Drum heater temperature control circuit
SW1
SW2
SW3
Toner dust collecting fan motor 1
J 303
-2
M10
Q303
J 304
-5
J 101
-14A
TDCM1
M10 ON when "0"
Toner dust collecting fan motor 2
J 303
-4
M9
Q304
J 304
-4
-13A
TDCM2
M9 ON when "0"
Lower fixing roller cleaning belt winding motor
J 303
-6
M6
J 303
-1
J 304
-2
-12A
CLBMD
M6 ON when "0"
RL301
J 2-5
FU2
TS1
J 302
-2
H1
Fixing roller heater (upper)
J 2-3
Q1
Q305
J 304
-7
-15A
UHTRD
H1 ON when "0"
H2
Fixing roller heater (lower)
J 2-4
Q2
-8
Q306
J 304
-8
-16A
LHTRD
H2 ON when "0"
Turret motor driver PCB
Turret motor controller PCB
See page 3-31
Driver unit
M4
Turret motor
Drum motor
M1
Main motor
M2
Motor driver PCB
J 402-1
-2
J 102
-1B
-2B
DRMD
M1 ON when "0"
MNMD
M2 ON when "0"
Scanner mirror
M13
Scanner mirror motor driver PCB
J 204-1
-4
-12B
-13A
SCNON
SCNRDY
See page 3-14
HVT-DC1
HVT-DC2
HVT-DC3
HVT-DC4
Potential control PCB
See page 3-17
HVT-AC1
J 101-14B
HVSP
HVT-AC2
-13B
PDCD

Figure 3-8

E. Basic Sequence of Operations

1. General

Timing of printing operations is based on the TRANSFER DRUM HOME POSITION signal.

The diameter of the transfer drum is twice that of the photosensitive drum, so the latter rotates twice during one rotation of the former.

2. Operations at power on

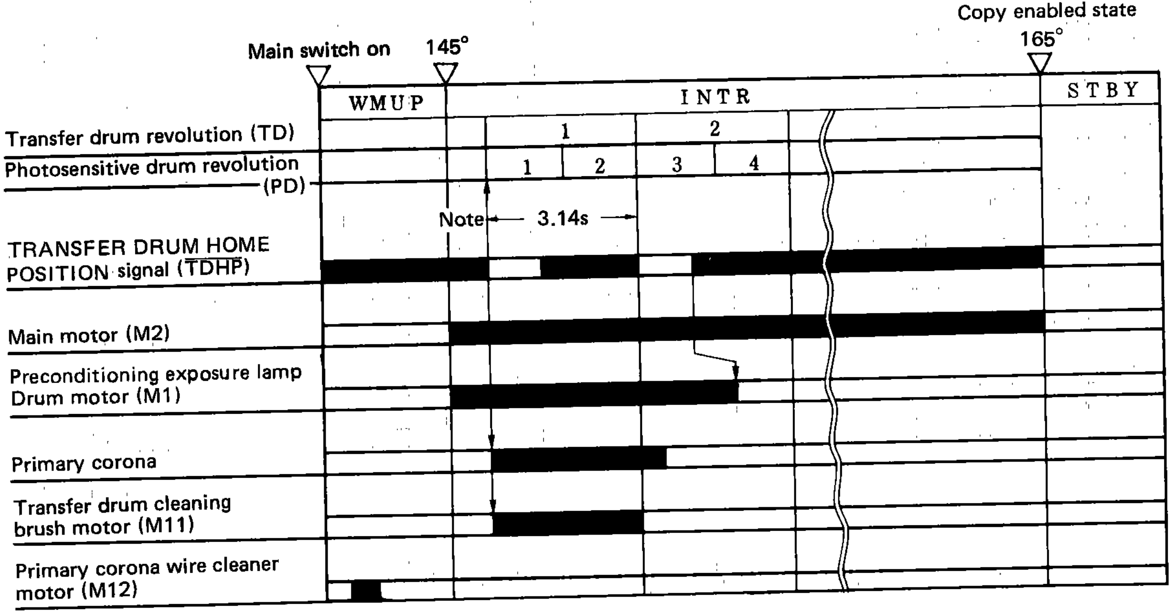

Copy enabled state
165°
Main switch on
145°
WMUP
INTR
STBY
Transfer drum revolution (TD)
1
2
Photosensitive drum revolution (PD)
1
2
3
4
Note
3.14s
TRANSFER DRUM HOME POSITION signal ($\overline{\text{TDHP}}$)
Main motor (M2)
Preconditioning exposure lamp
Drum motor (M1)
Primary corona
Transfer drum cleaning brush motor (M11)
Primary corona wire cleaner motor (M12)

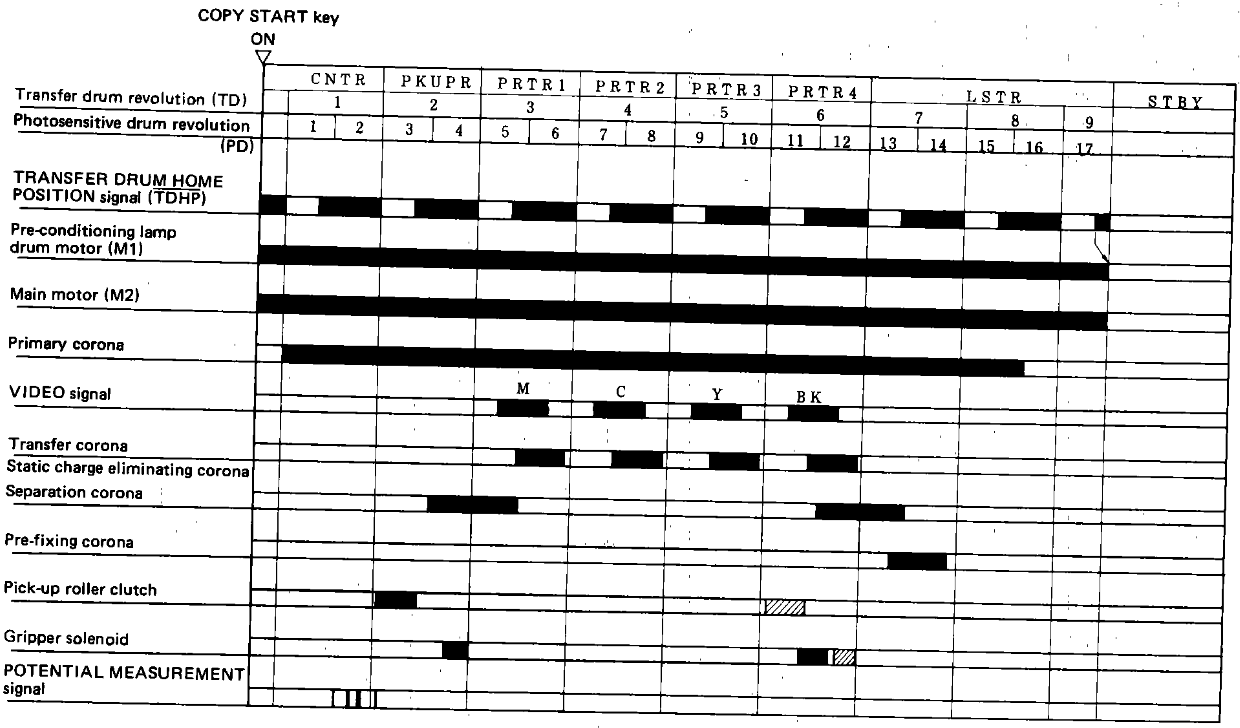
Figure 3-9

Period		Purpose	Remarks
WM UP (WARM-UP)	Period from setting main switch ON until fixing roller surface temperature reaches 145°C.	To allow fixing rollers to heat up.	· The warm-up period varies with the initial temperature of the fixing rollers. · If the temperature of the fixing rollers is below 100°C, the primary corona wire is cleaned.
INTR (INITIAL ROTATION)	Period from fixing roller surface temperature reaching 145°C until reaching 165°C.	To complete warm-up and to stabilize sensitivity of photosensitive drum in preparation for printing.	· Transfer drum rotates twice, then stops.
STBY (STANDBY)	Period from completion of INTR until COPY START key is pressed or main switch is set OFF.	Printer is in readiness for operation.	

Table 3-1

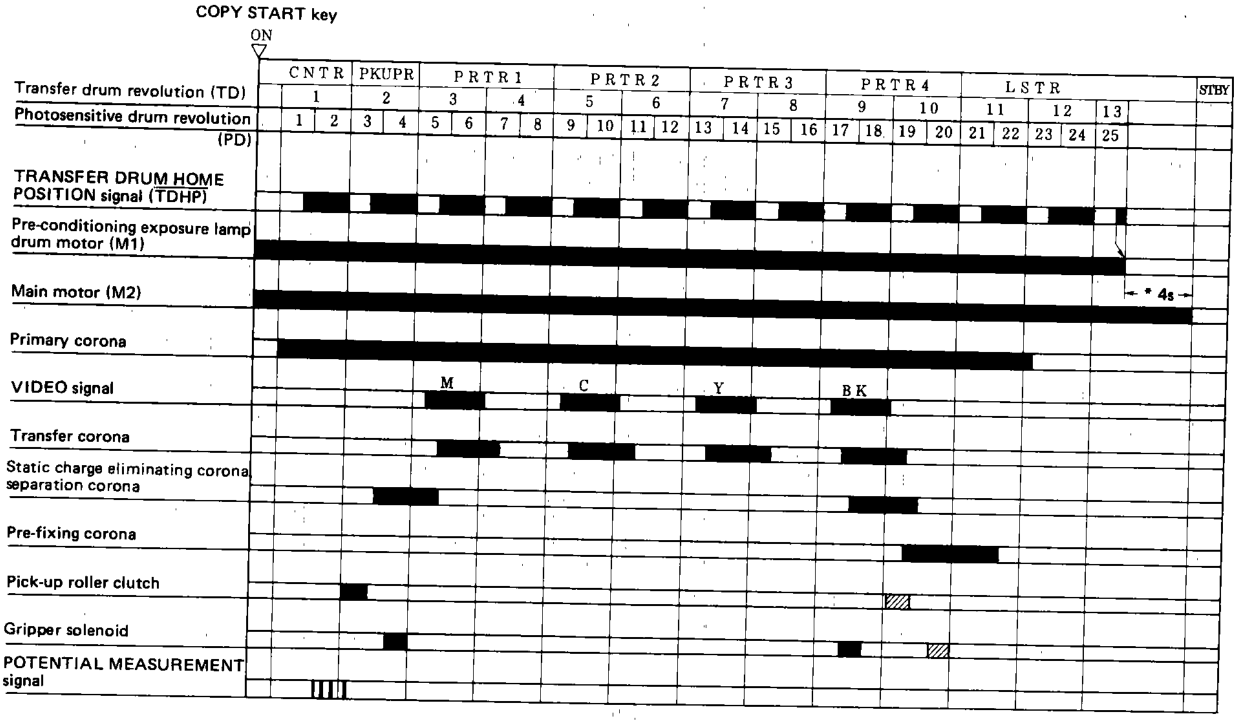
Note 1:
The position at which the transfer drum stops is not fixed, so when it rotates, the falling edge of the TRANSFER DRUM HOME POSITION signal is used as the indication of the home position.

3. Copying basic sequence



▨ From second-sheet pick-up

Figure 3-10 A4/letter/full color/1 sheet copy



▨ From second sheet pick-up

※ To deliver the copy paper

Figure 3-11 Other than A4/Letter/full color/1 sheet copy

Period		Purpose	Remarks
CNTR POTENTIAL ADJUSTMENT (CONTROL ROTATION)	Period from pressing COPY START key until end of first transfer drum rotation.	· For measurement and adjustment of drum surface potential. · For stabilizing drum sensitivity is in preparation for copying.	· If the developing assembly turret is not at the home position, it is returned to the home position. · If potential adjustment has not been performed, copying operation begins from PKUPR.
PKUPR (PICK-UP ROTATION)	Period from completion of CNTR until copy paper is held firmly by transfer drum grippers.	· For clearing static changes from transfer drum surface. · For feeding copy paper to transfer drum to receive toner images.	
PRTR 1, 2, 3, 4 (PRINTING ROTATIONS 1, 2, 3, 4)	Period from end of PKUPR until all toner is transferred to the copy paper.	For generating electrostatic latent image by laser and developing visible toner image (for all colors).	
LSTR	Period from completion of PRTR until main motor stops.	For post-processing electrostatic cleaning of photosensitive drum.	

Table 3-2

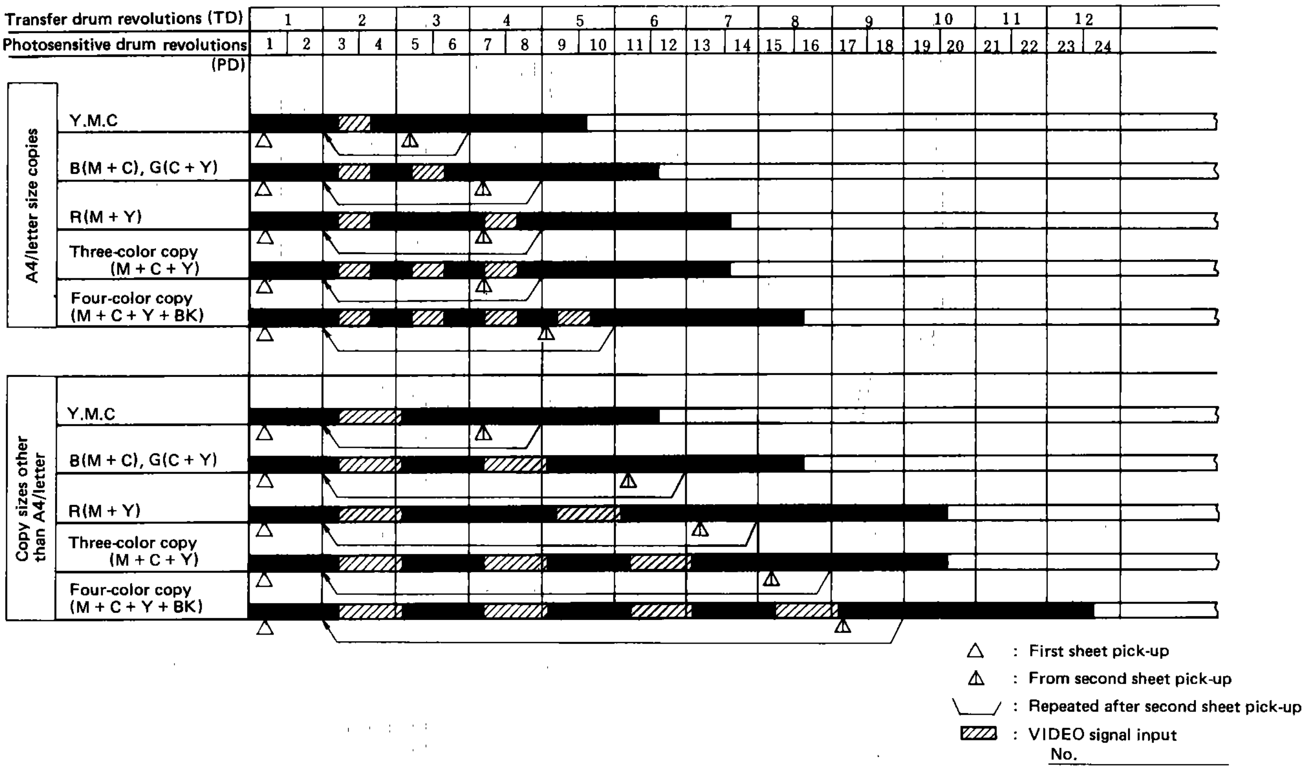

Transfer drum revolutions (TD)
1 2 3 4 5 6 7 8 9 10 11 12
Photosensitive drum revolutions (PD)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
A4/letter size copies
Copy sizes other than A4/letter
Y.M.C
B(M + C), G(C + Y)
R(M + Y)
Three-color copy (M + C + Y)
Four-color copy (M + C + Y + BK)
△ : First sheet pick-up
⚠ : From second sheet pick-up
\___/ : Repeated after second sheet pick-up
▨ : VIDEO signal input
No.

Figure 3-12 Operations for continuous copying (CNTR not included)

II. EXPOSURE SYSTEM

A. Laser Scanner

The laser scanner consists of a laser unit which generates the laser beam, and a ten-sided prism mirror which rotates and repeatedly scans the laser beam across the photosensitive drum.

The video signals (VDO0 to VDO7) sent from the image scanner unit to the printer are converted into LD laser intensity signal by the controller PCB. The LD signal both switches the laser (semiconductor type) ON and OFF and sets its intensity. The collimator turns the laser beam into a narrow parallel beam of elliptical cross section, then the cylindrical lens converts this to a flat belt-shaped parallel beam. This laser beam is reflected by successive faces of the rotating prismatic scanning mirror, passes through the imaging lens, and sweeps repeatedly across the photosensitive drum, one such horizontal scan per face.

Each time the laser is switched ON, it causes the removal of electrostatic charges from a minute area of the drum. Because the mirror is always turning, each time the laser goes on it strikes a different place. By switching it ON rapidly, adjacent areas can be treated to build up image areas, the electrostatic latent image which is subsequently developed by toner.

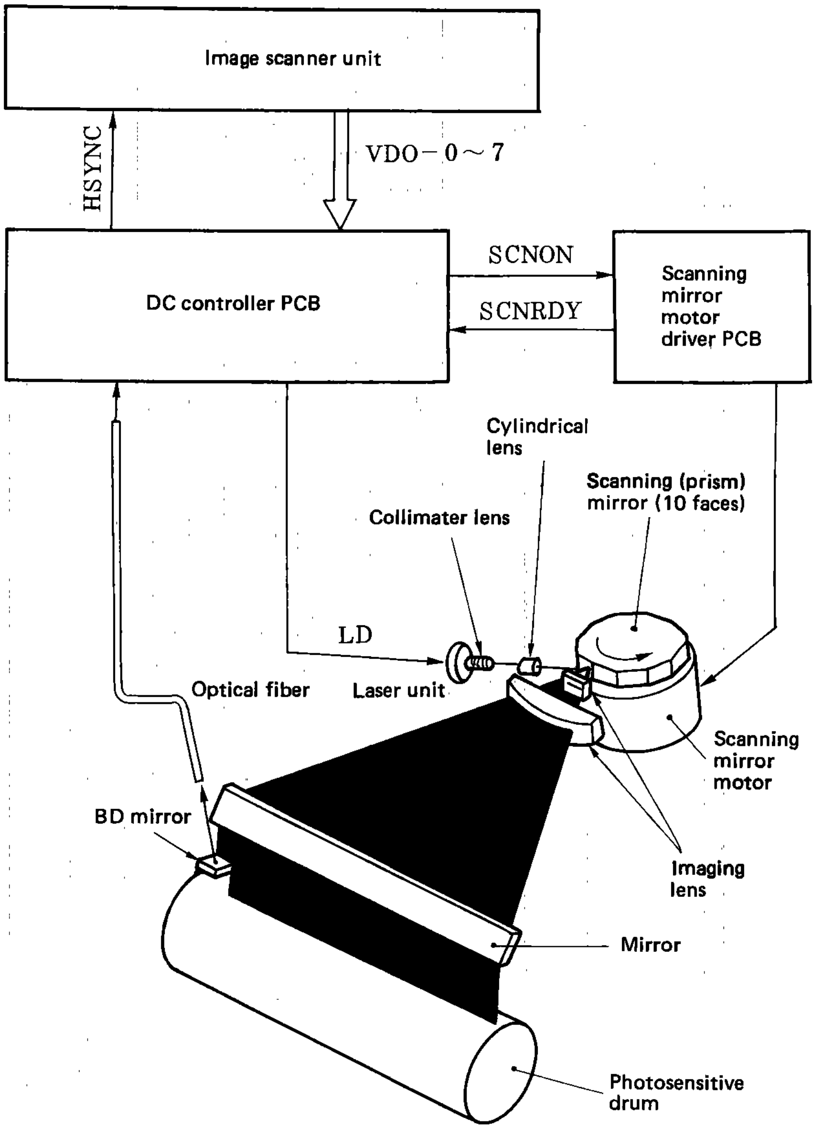


Image scanner unit
HSYNC
VDO−0～7
DC controller PCB
SCNON
SCNRDY
Scanning mirror motor driver PCB
Cylindrical lens
Scanning (prism) mirror (10 faces)
Collimater lens
LD
Optical fiber
Laser unit
Scanning mirror motor
BD mirror
Imaging lens
Mirror
Photosensitive drum

Figure 3-13

B. Laser Driver Circuit

1. Introduction

The circuit shown in Figure 3-14 produces the LASER INTENSITY CONTROL signal, LD, to suit the information supplied by the 8-bit video signal (VDO-0 to VDO-7) from the image scanner unit. Its main functions are as follows.

1. To set the laser intensity in response to the video signal
2. To switch the laser ON/OFF
3. To control laser unit temperature

2. Laser intensity control according to video signal

The 8-bit video signal from the scanner unit digital processor PCB is input to the laser emission intensity control circuit on the DC controller PCB. Laser intensity output is determined by the laser emission intensity control circuit according to the density level of the video signal.

3. Switching laser on/off

The laser current switching circuit switches the laser element ON/OFF required for the intensity indicated by the video signal.

The current of drive pulses to the laser element can be adjusted using VR100, VR101 and VR116.

> **Note:**
> A laser power tester ("checker"; TKN-0198) and digital multimeter must be used when adjusting the laser intensity. (The laser element can be destroyed by excessive current, so current must be adjusted carefully during servicing.) See Chapter 7 for details.

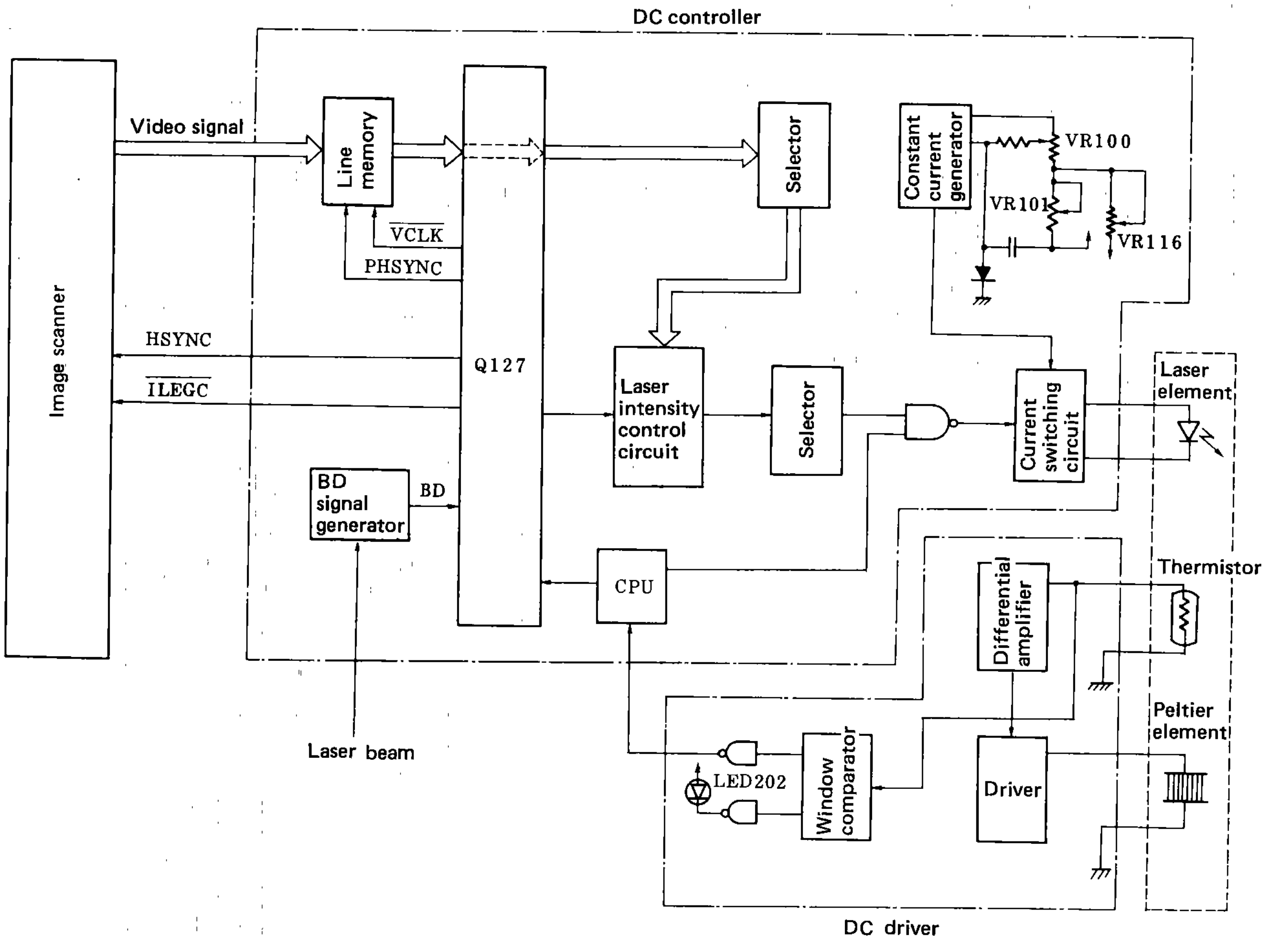

DC controller
Image scanner
Video signal
Line memory
VCLK
PHSYNC
HSYNC
ILEGC
Q127
BD signal generator
BD
Laser beam
Selector
Laser intensity control circuit
Selector
CPU
Constant current generator
VR100
VR101
VR116
Current switching circuit
Laser element
Thermistor
Differential amplifier
Peltier element
LED202
Window comparator
Driver
DC driver

Figure 3-14

4. Laser unit temperature control

This circuit controls the temperature of the laser unit. To stabilize laser beam the intensity of the beam from the laser, the temperature must be maintained constant. Temperature is sensed by a thermistor, and the laser element is heated or cooled by passing current in one direction or the other of the Peltier element.

When the laser reaches the correct temperature LED202 goes ON indicating that the laser is ready to be used.

> **Note:** Peltier effect
> When current flows through the junction of different conductors (or semiconductors), heat is absorbed or generated (other than resistive, depending on the direction of the current.

C. Scanning Mirror Motor Driver Circuit

The scanning mirror drive motor is a 4 phase, 4 pole DC motor with Hall elements. It turns the scanning mirror at constant speed.

When a SCANNER DRIVE command $\overline{\text{SCNON}}$ "0" is received from the operation controller, this circuit is activated to maintain the scanning mirror drive motor speed constant. When the correct speed is reached, signal $\overline{\text{SCNRDY}}$ goes to "0".

The scanning mirror drive motor is shown with its control circuit in Figure 3-15. Two Hall devices spaced 135° sense the position of the rotor (permanent magnet type) and switch current through coils A and D or B and C, as required to attract the rotor to the next position.

As the N pole of the rotor approaches a Hall element, its (−) side goes negative, and (+) side goes positive, thus developing an EMF. (When the S pole approaches, the EMF will be developed in the opposite direction.)

In Figure 3-15, Hall element I is facing an N pole of the rotor, so a is "0". This causes current flow through stator A. As stator A applies a magnetic force to the S pole facing it, the S pole (and consequently, the rotor) is repelled, and stator A attracts the following N pole on the rotor. Thus, the motor turns in the direction of the arrow.

As the motor rotates through approximately 45°, Hall element I stops generating an emf, cutting off current flow in stator A. And an S pole is facing Hall element II, which then generates an emf. Now b goes "0" and current flows in stator B. Its magnetic force repels the N pole and attracts the S pole.

This process is repeated every time the rotor turns through 45°, with c,d, and a going "0" in order, this magnetizes stators C, D, and A in order.

The speed of the rotor is maintained constant by the control circuit using feedback from the frequency generator F.G., a Hall IC.

Overcurrent in the stators activates the current limiter, shutting off the current.

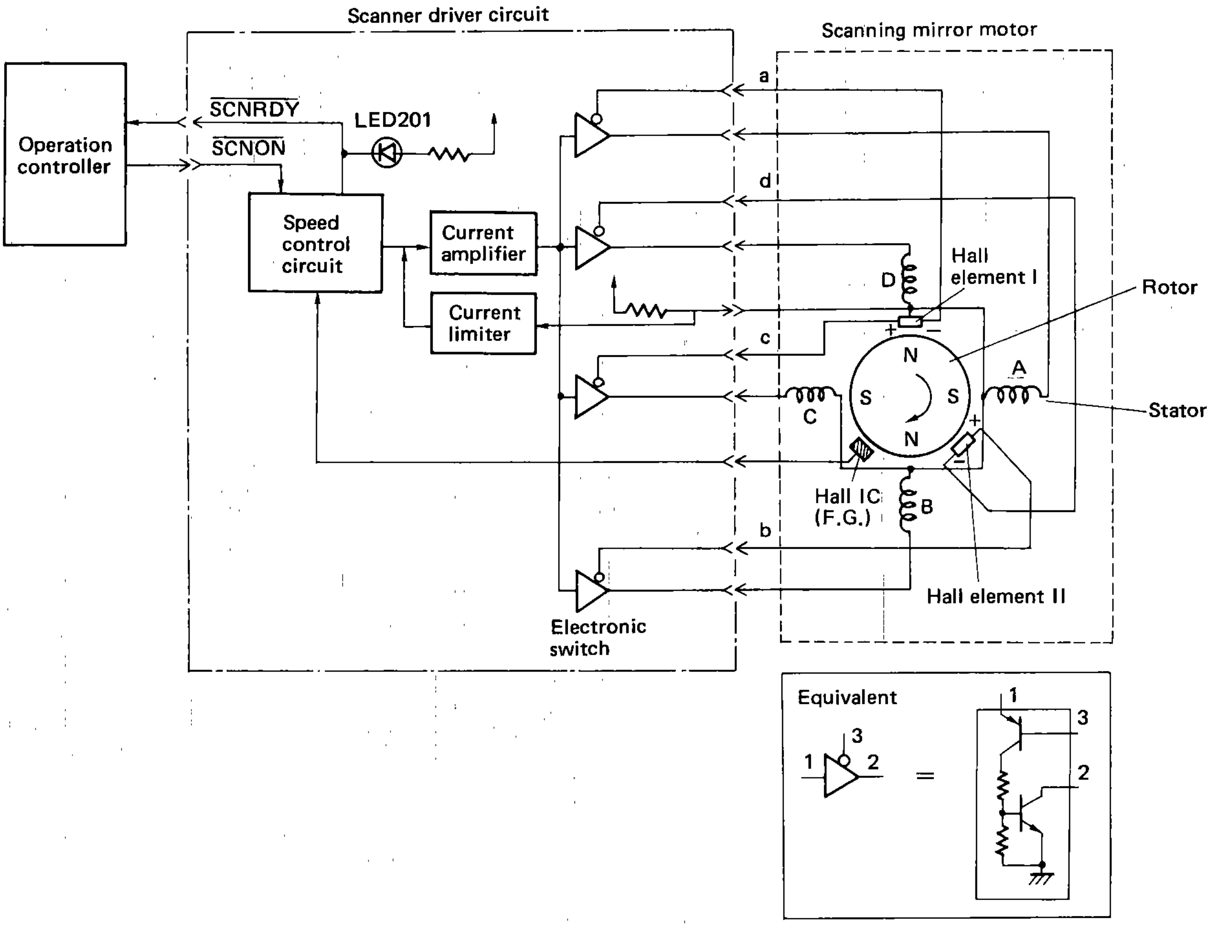

Scanner driver circuit
Scanning mirror motor
Operation controller
$\overline{\text{SCNRDY}}$
$\overline{\text{SCNON}}$
LED201
Speed control circuit
Current amplifier
Current limiter
a
d
c
b
Hall element I
D
Rotor
N
S
S
N
A
Stator
C
Hall IC (F.G.)
B
Hall element II
Electronic switch
Equivalent
1
2
3
=
1
3
2

Figure 3-15

D. Horizontal/Vertical Synchronization

1. Horizontal synchronizaiton

A horizontal synchronizaton signal is required to cause the Image Scanner to transfer each element of the video signal to the printer.

Horizontal synchronization signal (HSYNC) is generated by Q127 of the beam detection signal generating circuit on the DC controller PCB when laser light (signal BD) reflected by the BD mirror and conducted by the optical fiber strikes the photocell of the circuit.

In response to HSYNC, the Image Scanner sends one set (element) of video data (VDO-0 to VDO-7) to the printer DC controller PCB where they are stored in the line memory.

These data are sequentially read out in response to the PRINTER HORIZONTAL SYNCHRONIZATION signal (PHSYNC) and used to generate the LASER INTENSITY CONTROL signal. This, in turn, is used to generate the LD drive signal that operates the laser.

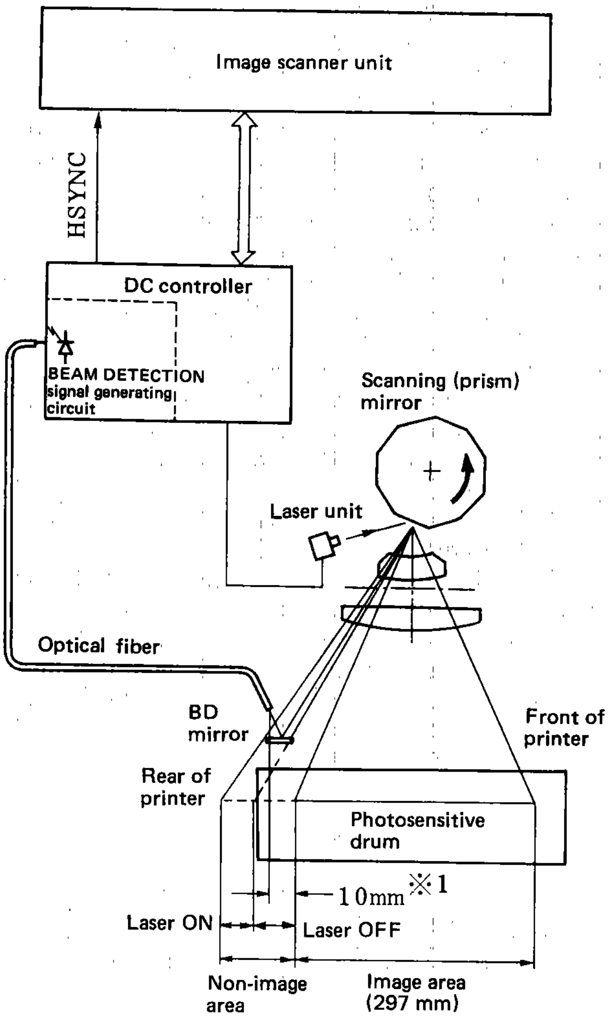


Image scanner unit
HSYNC
DC controller
BEAM DETECTION signal generating circuit
Scanning (prism) mirror
Laser unit
Optical fiber
BD mirror
Front of printer
Rear of printer
Photosensitive drum
10mm ※1
Laser ON
Laser OFF
Non-image area
Image area (297 mm)

Figure 3-16

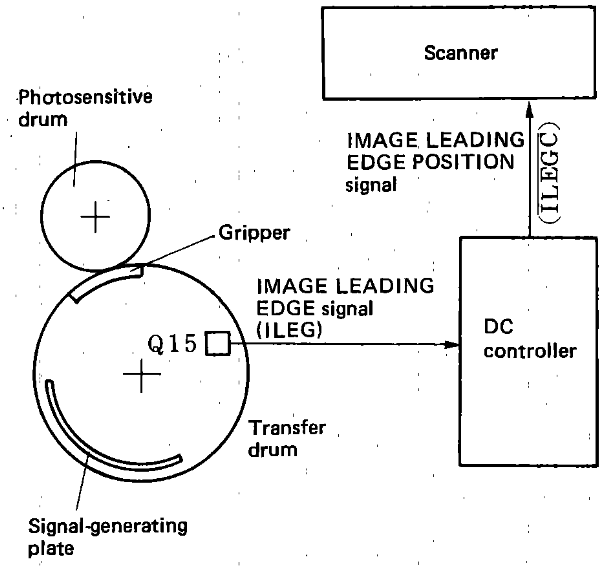
*1. The front edge of the copy paper always passes along the same line (right side of drum in Figure 3-16), so the starting point of scanning (left (i.e., rear) side of the drum) will vary with the paper size, as will the non-image area.

2. Vertical synchronization

A vertical scanning timing signal is required for the Image Scanner unit to transfer the video signal to the printer.

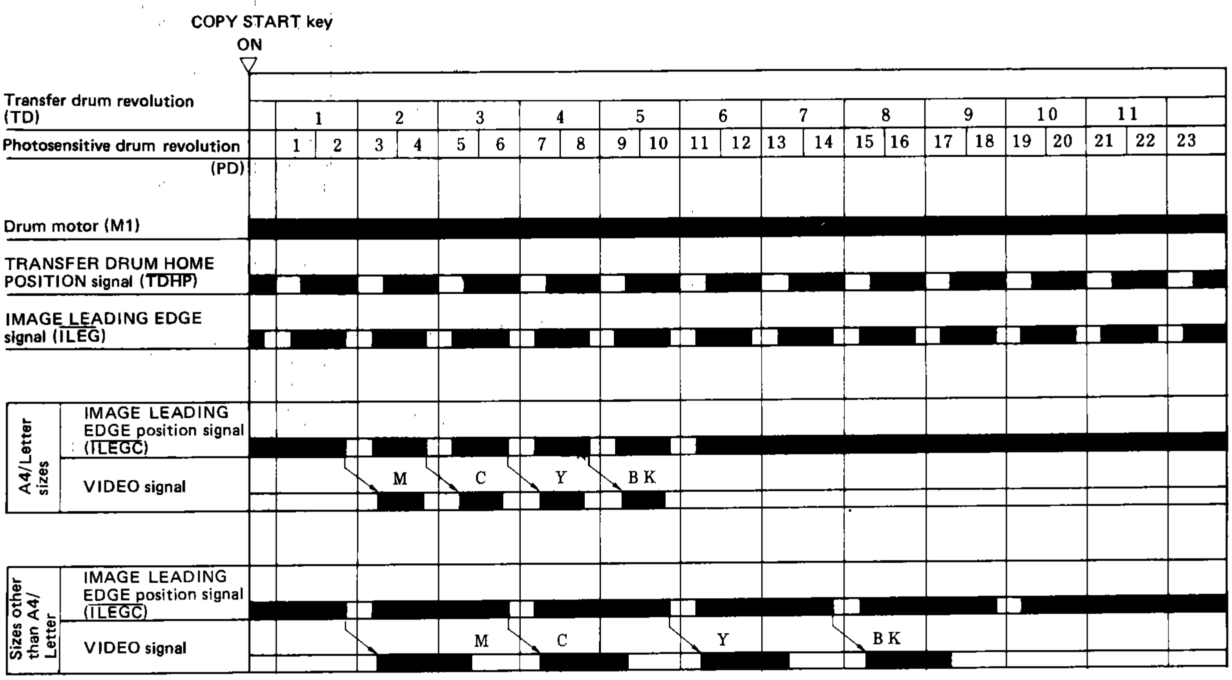
In order to ensure that the various color toner images (up to four) are overlaid in accurate registration on the copy, it is necessary to identify the position of the leading edge of the paper on the transfer drum so that scanning by the laser beam (to form the image) can begin at the correct point on the photosensitive drum. This VERTICAL SCAN TIMING signal is produced by the image leading edge sensor (Q15) inside the transfer drum unit and a signal generating plate on the outer of the drum. The IMAGE LEADING EDGE signal (ILEG) from Q15 goes to the DC controller, which generates the IMAGE LEADING EDGE POSITION signal (ILEGC) and sends it to the scanner.

The IMAGE LEADING EDGE POSITION signal is not generated for each rotation of the transfer drum. For paper longer than A4/Letter, the signal is generated for every second rotation of the transfer drum in order to provide sufficient time for developing the image for the larger page the length of the copy paper.



Scanner
IMAGE LEADING EDGE POSITION signal
(ILEGC)
Photosensitive drum
Gripper
IMAGE LEADING EDGE signal (ILEG)
Q15
DC controller
Transfer drum
Signal-generating plate

Figure 3-17



COPY START key ON
Transfer drum revolution (TD)
1
2
3
4
5
6
7
8
9
10
11
Photosensitive drum revolution (PD)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Drum motor (M1)
TRANSFER DRUM HOME POSITION signal (TDHP)
IMAGE LEADING EDGE signal (ILEG)
A4/Letter sizes
IMAGE LEADING EDGE position signal (ILEGC)
VIDEO signal
M
C
Y
BK
Sizes other than A4/Letter
IMAGE LEADING EDGE position signal (ILEGC)
VIDEO signal
M
C
Y
BK

Figure 3-18

III. IMAGE FORMATION SYSTEM

A. Drum Surface Potential Control System

1. General

The main causes of variation in copy image quality are variation in the electrostatic latent image and variation in development.

Two major factors causing variation in static latent image are:

1. Variation in drum sensitivity (V_L) due to age and environment
2. Variation in primary corona current to the drum

Development characteristics can vary due to changes in behavior of the toner during development resulting from different combinations of temperature and relative humidity, as well as because of deterioration or wear of mechanical parts and dirt inside the printer.

The function of the drum surface potential control system is to compensate for these problems. It does this by adjusting the bias on the grid of the primary corona unit and the DC component of the bias on the developing cylinder in response to changes in the drum surface potential measured by the surface potential sensor.

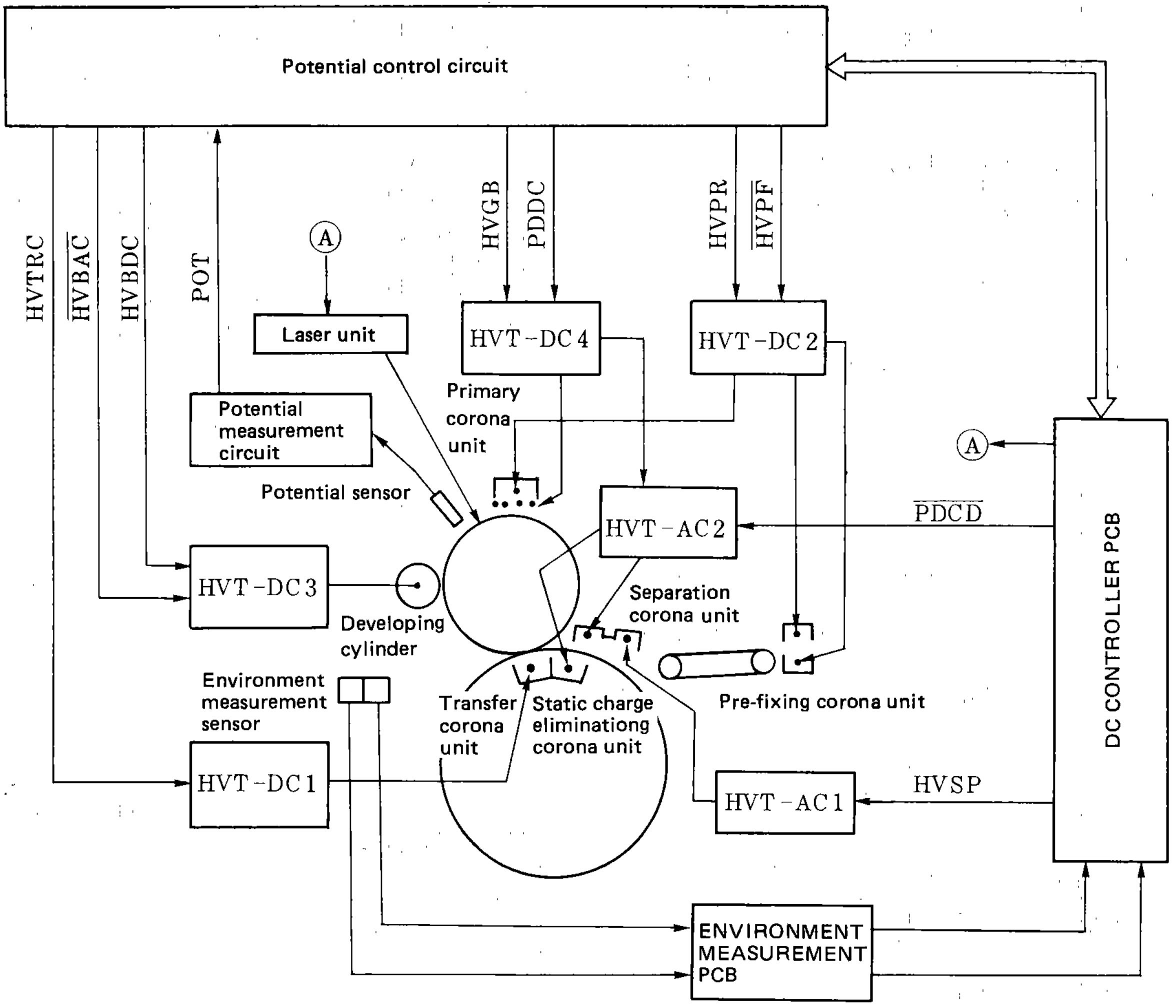

Potential control circuit
HVTRC
HVBAC
HVBDC
POT
Ⓐ
HVGB
PDDC
HVPR
HVPF
Laser unit
HVT-DC4
HVT-DC2
Primary corona unit
Potential measurement circuit
Potential sensor
Ⓐ
PDCD
HVT-AC2
HVT-DC3
Developing cylinder
Separation corona unit
Environment measurement sensor
Transfer corona unit
Static charge eliminationg corona unit
Pre-fixing corona unit
DC CONTROLLER PCB
HVT-DC1
HVT-AC1
HVSP
ENVIRONMENT MEASUREMENT PCB

Figure 3-19

2. Control system

The potential-control system has two functions. It controls the bias on the grid of the primary corona unit, and it controls the bias on the developing cylinder so that the differential between developing cylinder bias and light-area potential (on the drum) is maintained constant. This differential is the contrast potential (developing bias differential).

a. Setting the target contrast potential (target developing bias differential)

A sensor near the developing unit senses the conditions nearby.

The control system then establishes a target contrast potential (target developing bias differential) for developing each color based on the measurements. This is represented by Figure 3-20.

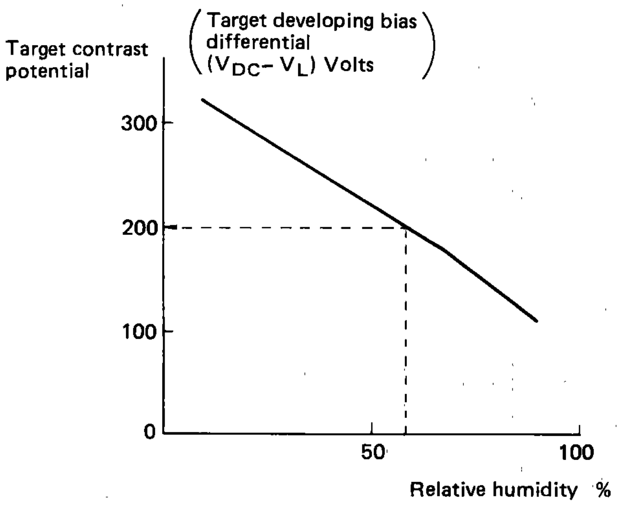


Figure 3-20

b. Surface potential measurement

To determine the characterists of the drum, the surface potential in a dark area (laser OFF; V_D) and in a light area (laser ON; V_L) is measured for a fixed primary corona current using one of two pairs of different primary corona grid bias voltages (V_G). The bias voltages are selected on the basis of the target contrast potential (from Figure 3-20) using the following table

Primary corona grid bias / Target contrast potential	V_G1	V_G2	V_G3
More than 250V	−300V	−500V	−800V
Less than 250V	−300V	−600V	−800V

Table 3-3

Thus, V_D1 and V_L1 are measured with V_G1, V_D2 and V_L2 with V_G2 and V_D3 and V_L3 with V_G3. Straight lines can be drawn through V_D1, V_D2, and V_D3 and through V_L1, V_L2 and V_L3, giving the plot shown in Figure 3-22.

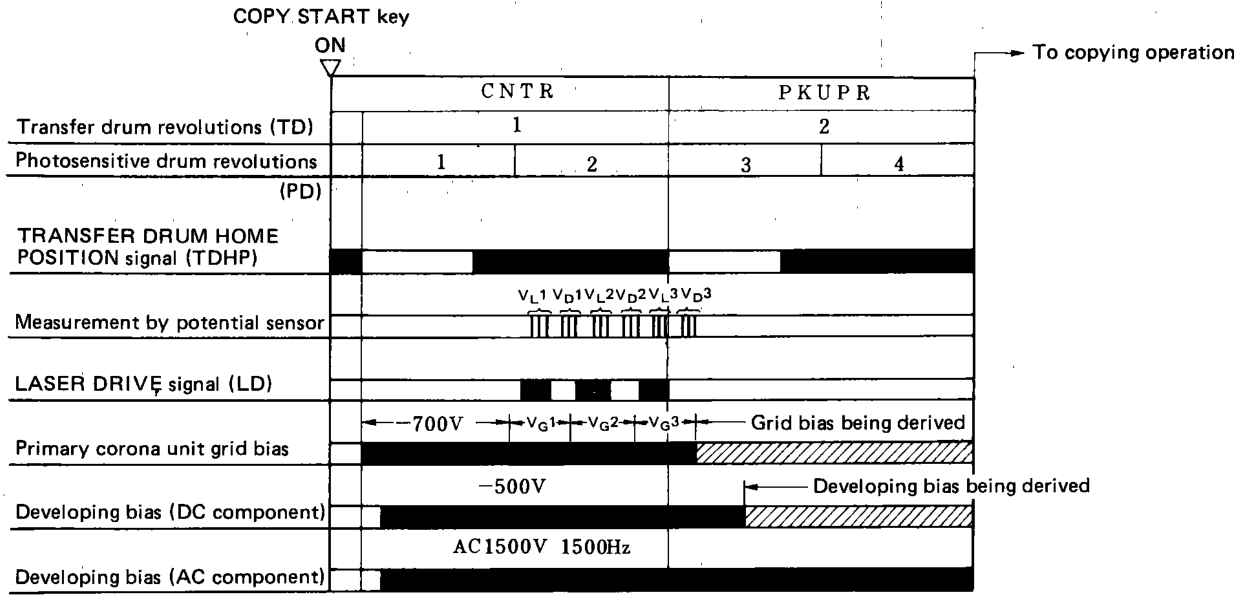

COPY START key ON
To copying operation
CNTR
PKUPR
Transfer drum revolutions (TD)
1
2
Photosensitive drum revolutions (PD)
1
2
3
4
TRANSFER DRUM HOME POSITION signal (TDHP)
Measurement by potential sensor
VL1 VD1 VL2 VD2 VL3 VD3
LASER DRIVE signal (LD)
Primary corona unit grid bias
−700V
VG1
VG2
VG3
Grid bias being derived
Developing bias (DC component)
−500V
Developing bias being derived
Developing bias (AC component)
AC1500V 1500Hz

Figure 3-21

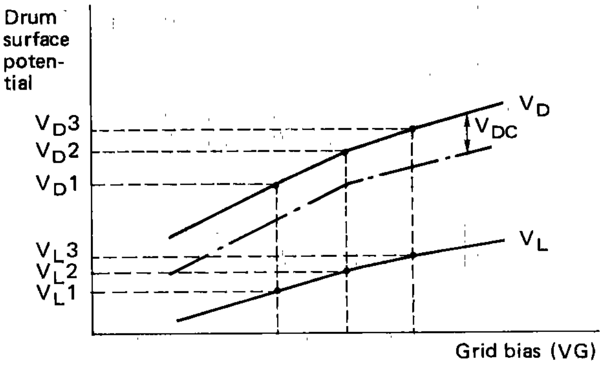


Figure 3-22

Surface potential measurement / Time of copying operation	Number of potential measurements					
	V_G1		V_G2		V_G3	
	V_D	V_L	V_D	V_L	V_D	V_L
First copy after power switched ON	3	3	3	3	3	3
First copy in every 4 min. period after power switched ON						
First copy after paper jam cleared						

Table 3-4

c. Setting grid bias and developing cylinder bias

The data from surface potential measurements (represented by Figure 3-22) are next used to determine the conditions that will give the required combination of developing cylinder bias DC component and grid bias. In Figure 3-23 the line V_{DC} represents developing cylinder bias. It is 100V more positive than V_D for any value of V_D (system constant). The target contrast potential has been established using Figure 3-20. There is only one value of grid bias in Figure 3-23 that produces the required developing bias differential (V_{DC}-V_L). This is shown in Figure 3-23 with example numerical values.

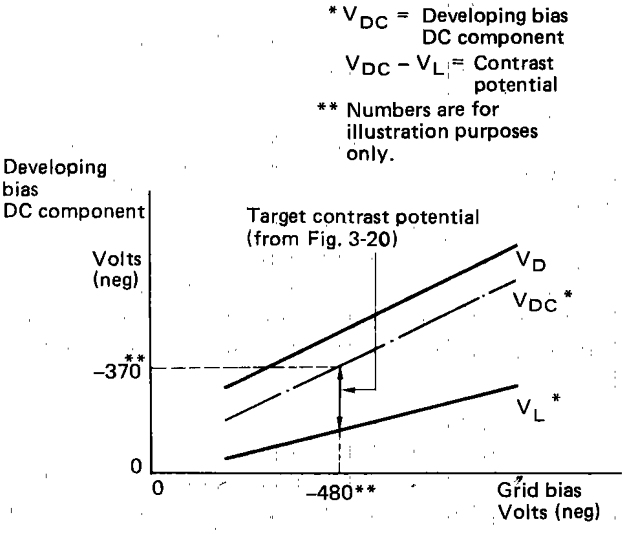


Figure 3-23

The control systems for primary corona unit grid bias and developing cylinder bias then set and maintain these voltages.

d. Manual selection of grid bias/developing cylinder bias

Five fixed values of developing bias differential can be selected using the Service mode.

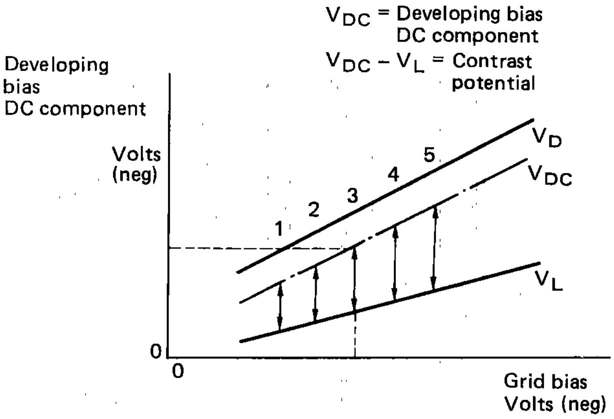


Figure 3-24

3. Potential sensing circuit

Figure 3-26 shows the block diagram of the potential sensing circuit.

Drive signal

F24VDC is supplied from the high-voltage transformer (HVT) to the surface potential measurement circuit as the SENSOR DRIVE signal. This signal powers the sensor drive oscillator in the potential measurement circuit. The output of the oscillator (square wave) is applied to one of two piezoelectric elements mounted on the chopper in the sensor, causing the chopper to vibrate.

Sensor/chopper

Movement of the chopper compresses and releases the other piezoelectric element on the chopper, generating a voltage which is then fed back to the sensor drive oscillator circuit to maintain the oscillation.

Electrical charges on the drum (which give the drum its surface potential) induce a voltage in the electrode of the sensor. The vibrating chopper alternately blocks and unblocks the path between the charges and the electrode, so that the voltage induced in the electrode is converted to an AC voltage. This voltage is amplified by the preamplifier in the sensor and then transmitted to the filter/gain-control circuit on the potential measurement PCB.

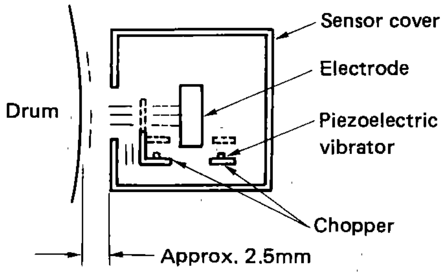

Sensor cover
Electrode
Drum
Piezoelectric vibrator
Chopper
Approx. 2.5mm

Figure 3-25 Cross-section view of the potential sensor

Bias voltage

A bias voltage is applied to the sensor. The electrode senses any difference between the drum surface potential and the bias voltage, and feeds the difference back to the sensor unit in such a way as to reduce the difference to zero. Therefore, the operation is repeated until the bias voltage is equal to the drum surface potential. (This is called the "null-balance" method of measurement).

The same bias voltage is used as the reference voltage for the oscillator circuit, the sync signal adjusting circuit, and the filter/gain control circuit. This means that the reference voltage of these circuits varies continually as the drum surface potential changes.

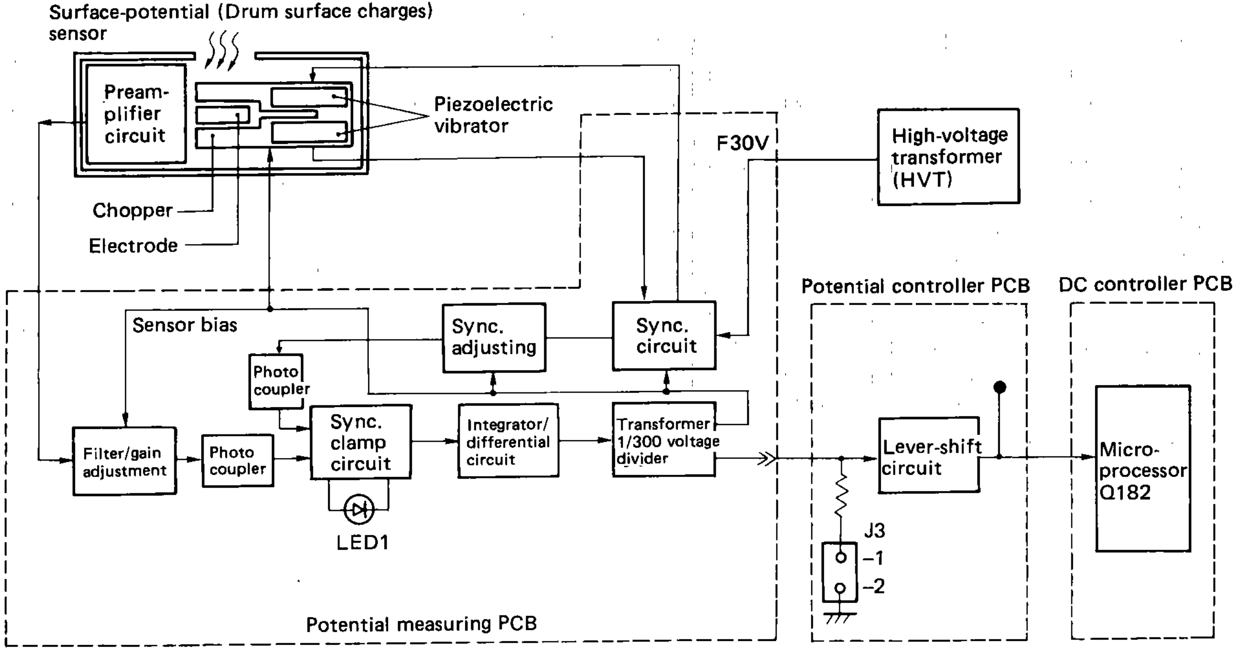

Surface-potential sensor
(Drum surface charges)
Preamplifier circuit
Piezoelectric vibrator
Chopper
Electrode
F30V
High-voltage transformer (HVT)
Sensor bias
Sync. adjusting
Sync. circuit
Photo coupler
Sync. clamp circuit
Integrator/ differential circuit
Transformer 1/300 voltage divider
Filter/gain adjustment
Photo coupler
LED1
Potential measuring PCB
Potential controller PCB
DC controller PCB
Lever-shift circuit
Micro-processor Q182
J3
-1
-2

Figure 3-26

If a signal is to be transmitted from any of these bias-referenced circuits to a ground-referenced circuit, the signal is passed via a photocoupler, thus transmitting the "information", but eliminating the difference between their "base" voltages.

The filter/gain control circuit eliminates electrical noise in the AC signal from the sensor preamplifier, amplifies the signal, and transmits it to the sync-clamp circuit through a photocoupler.

Identifying polarity of drum potential

The AC output signal would have the same magnitude if the drum potential were 300V higher or 300V lower than the sensor bias, only the phase would be different, by 180 degrees.

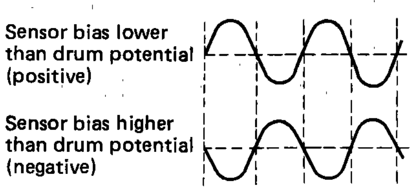

Sensor bias lower than drum potential (positive)
Sensor bias higher than drum potential (negative)

Figure 3-27

To distinguish whether the drum potential is higher or lower than the sensor bias voltage, the sync-clamp circuit combines the sensor output (via the filter and gain-control circuits) with the sync signal (the timing of which is adjusted by the sync signal adjusting circuit).

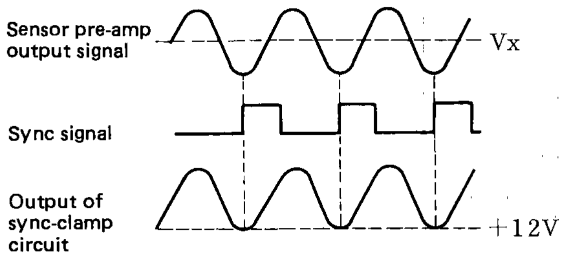

Sensor pre-amp output signal
Vx
Sync signal
Output of sync-clamp circuit
+12V

Figure 3-28 Drum potential higher than sensor bias

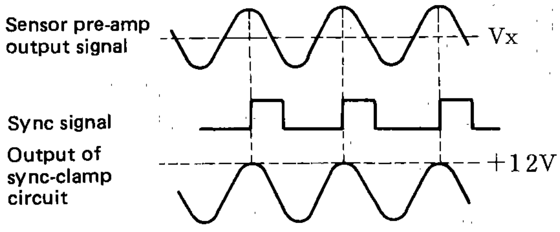

Sensor pre-amp output signal
Vx
Sync signal
Output of sync-clamp circuit
+12V

Figure 3-29 Drum potential lower than sensor bias

The rising edge of the sync signal is adjusted by the sync signal adjusting circuit so that it coincides with the peak of the AC signal from the sensor when the sensor chopper is closed.

The output of the sync-clamp circuit is integrated by the integrator, and amplified, then applied to the transformer. The transformer output, which is varied over the range 0V to −600V by the signal, is applied to the sensor as the sensor bias. It is also reduced to about 1/300 of its original value and transmitted to the level-shift circuit in the potential controller PCB.

The level-shift circuit divides the 0V-referenced signal to by 1/300 and adds 1V to the result.

The output signal (analog) from the level shift circuit is used directly by the microprocessor on the DC controller PCB (It can accept analog inputs).

■ Summary

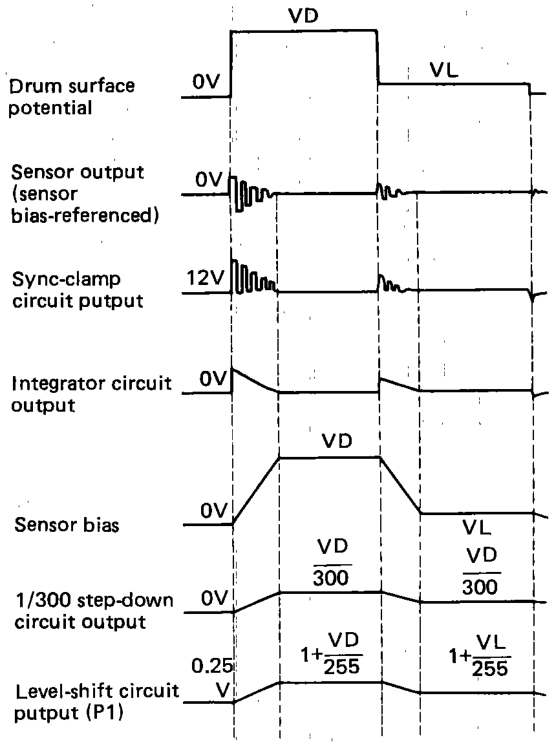

VD
Drum surface potential
0V
VL
Sensor output (sensor bias-referenced)
0V
Sync-clamp circuit putput
12V
Integrator circuit output
0V
VD
Sensor bias
0V
VL
VD/300
VD/300
1/300 step-down circuit output
0V
0.25V
1+VD/255
1+VL/255
Level-shift circuit putput (P1)

Figure 3-30

■ Check method

1) Check LED1 lights

LED1 should be ON whenever the copier is switched ON to indicate that the potential sensor measurement system is operating normally.

If it is not ON when the printer is ON, either the F24 V power supply is not supplying power or there is a fault in the potential measurement unit.

2) Check pins

- DC controller PCB pins J3-1 and J3-2 are used to determine whether the potential measurement unit is operating normally or not.

4. Primary/pre-fixing corona current control circuit

a. General

Figure 3-31 shows the circuit that controls the primary and pre-fixing corona currents. The main functions are:

- Switching primary and pre-fixing corona currents ON/OFF.
- Maintaining the primary and pre-fixing corona currents constant to eliminate the effects of environment.

b. Operation

1. Primary corona control system
   - When the PRIMARY-CORONA CURRENT-CONTROL signal (HVPR) exceeds 8 V, the voltage corresponding to the voltage of HVPR (analog) is outputted to the primary corona unit.
   - When HVPR becomes less than 8 V, the primary corona HV transformer goes OFF in the reverse of the above.
   - PRIMARY CORONA CURRENT CONTROL signal (HVPR) output (less than 8 V)
     - → Pulse width variable oscillation circuit OFF
       - → Primary high-voltage transformer OFF
       - → LED1 OFF
   - PRIMARY CORONA CURRENT-CONTROL signal (HVPR) outputted (over 8V)
     - → Pulse width modulation circuit ON
       - → Primary high-voltage transformer ON
       - → LED1 ON
2. Pre-fixing corona current control system
   - PRE-FIXING CORONA DRIVE command ($\overline{\text{HVPF}}$) = 0
     - → Switching circuit OFF
       - → Pulse width modulation circuit ON
         - → Pre-fixing corona HV transformer (T2) ON
         - → LED2 ON
   - PRE-FIXING CORONA DRIVE command ($\overline{\text{HVPF}}$) = 1
     - → Switching circuit ON
       - → Pulse width modulation circuit OFF
         - → Pre-fixing corona HV transformer (T2) OFF
         - → LED2 OFF

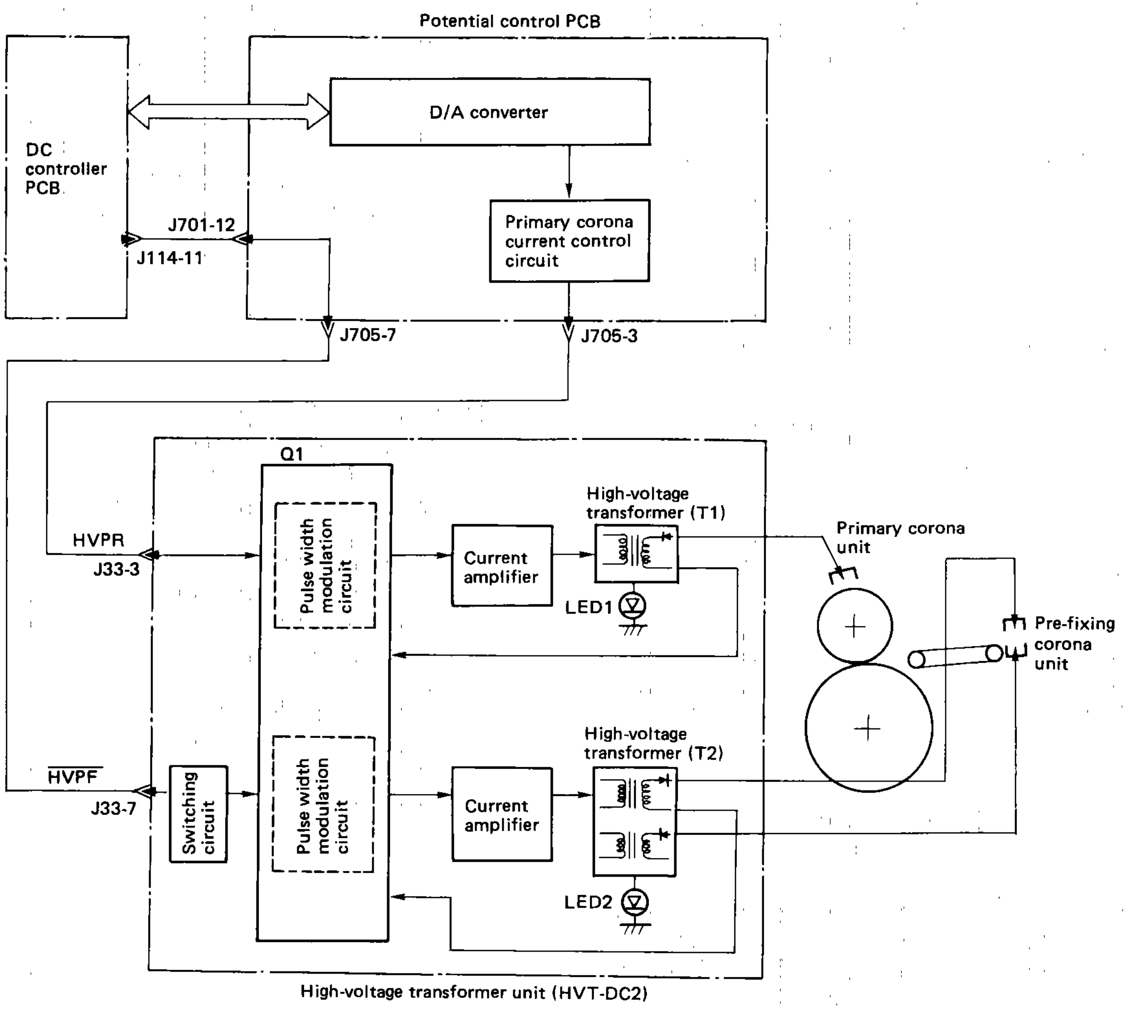

Potential control PCB
DC controller PCB
D/A converter
J701-12
J114-11
Primary corona current control circuit
J705-7
J705-3
Q1
HVPR
J33-3
Pulse width modulation circuit
Current amplifier
High-voltage transformer (T1)
LED1
Primary corona unit
Pre-fixing corona unit
HVPF
J33-7
Switching circuit
Pulse width modulation circuit
Current amplifier
High-voltage transformer (T2)
LED2
High-voltage transformer unit (HVT-DC2)

Figure 3-31

5. Primary Corona Unit Grid Bias Control System

a. General

The circuit in Figure 3-32 controls the bias voltage of the primary corona unit on the grid, and operates in response to a control signal from the microprocessor of the DC controller from the data obtained while the drum surface potential was being adjusted during CNTR.

The control signal from the DC controller is converted to analog control signal HVGB by the potential control PCB. HVGB controls the output of HVT (T1) by the pulse width modulation circuit.

b. Operation

When the GRID BIAS VOLTAGE CONTROL signal (HVGB) is below 16V, the grid bias voltage is proportional to the voltage of HVGB (analog).

If HVGB goes above 16 V the grid bias goes OFF.

- GRID VIAS VOLTAGE CONTROL signal (HVGB) less than 16V
  └→Pulse width modulation circuit ON
    └→Grid bias HV transformer ON
- GRID BIAS VOLTAGE CONTROL signal (HVGB) over 16V
  └→Pulse width variable oscillation circuit OFF
    └→Grid bias HV transformer OFF

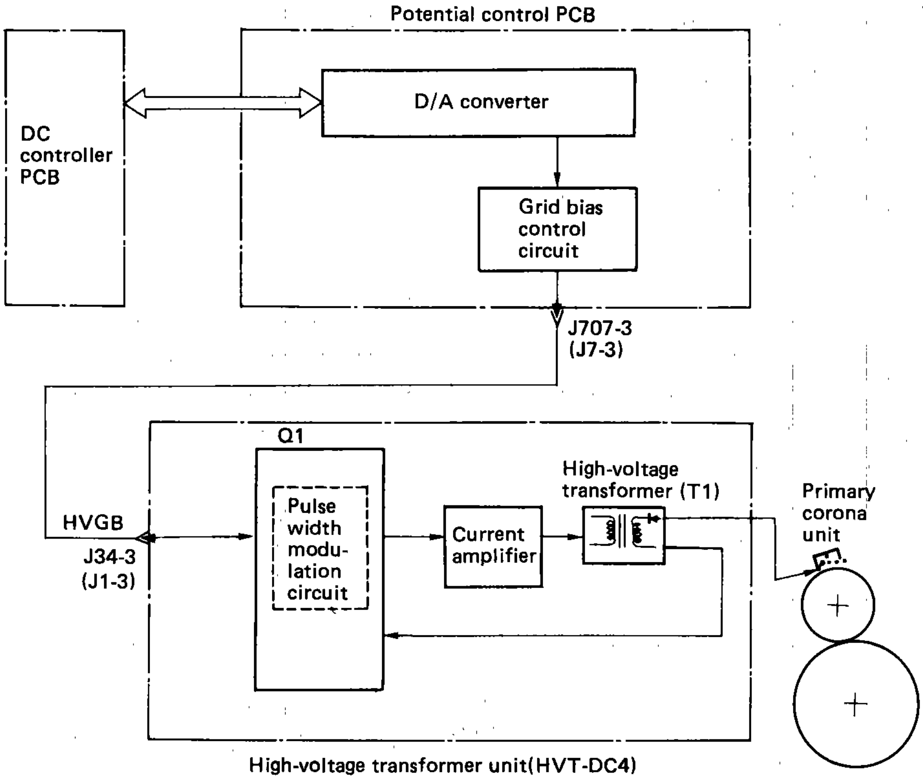

Potential control PCB
DC controller PCB
D/A converter
Grid bias control circuit
J707-3
(J7-3)
Q1
HVGB
J34-3
(J1-3)
Pulse width modulation circuit
Current amplifier
High-voltage transformer (T1)
Primary corona unit
High-voltage transformer unit(HVT-DC4)

Figure 3-32

6. Developing Bias Control Circuit

a. General

The circuit in Figure 3-33 control the developing unit bias voltage. The main functions of this circuit are as follows.

- Switching developing unit bias AC component ON/OFF
- Switching developing unit bias DC component ON/OFF
- Controlling voltage of developing unit bias DC component

b. Operation

1. Switching AC bias ON/OFF

- Developing bias AC drive command ($\overline{\text{HVBAC}}$) = 1
  └→AC bias switching circuit ON
    └→T1 drive circuit OFF
  and AC bias is not applied to the developing cylinder.
- Developing bias AC drive command ($\overline{\text{HVBAC}}$) = 0
  └→AC bias switching circuit OFF
    └→T1 drive circuit ON
  and AC bias is applied to the developing cylinder.

2. Switching DC bias ON/OFF and controlling bias voltage

When the DEVELOPING BIAS DC VOLTAGE CONTROL signal (HVBDC) exceeds 16V (analog), DC BIAS is not applied to the developing cylinder.

- When HVBDC less than 16V, DC BIAS is applied to the developing cylinder.
- DEVELOPING BIAS DC VOLTAGE CONTROL signal (HVBDC) over 16V
  └→Differential amplifier output LOW
    └→T2 drive circuit OFF
- DEVELOPING BIAS DC VOLTAGE CONTROL signal (HVBDC) less than 16V
  └→Differential amplifier HIGH
    └→T2 drive circuit ON
  and DC bias is applied to the developing cylinder, proportional to the voltage of HVBDC (analog).

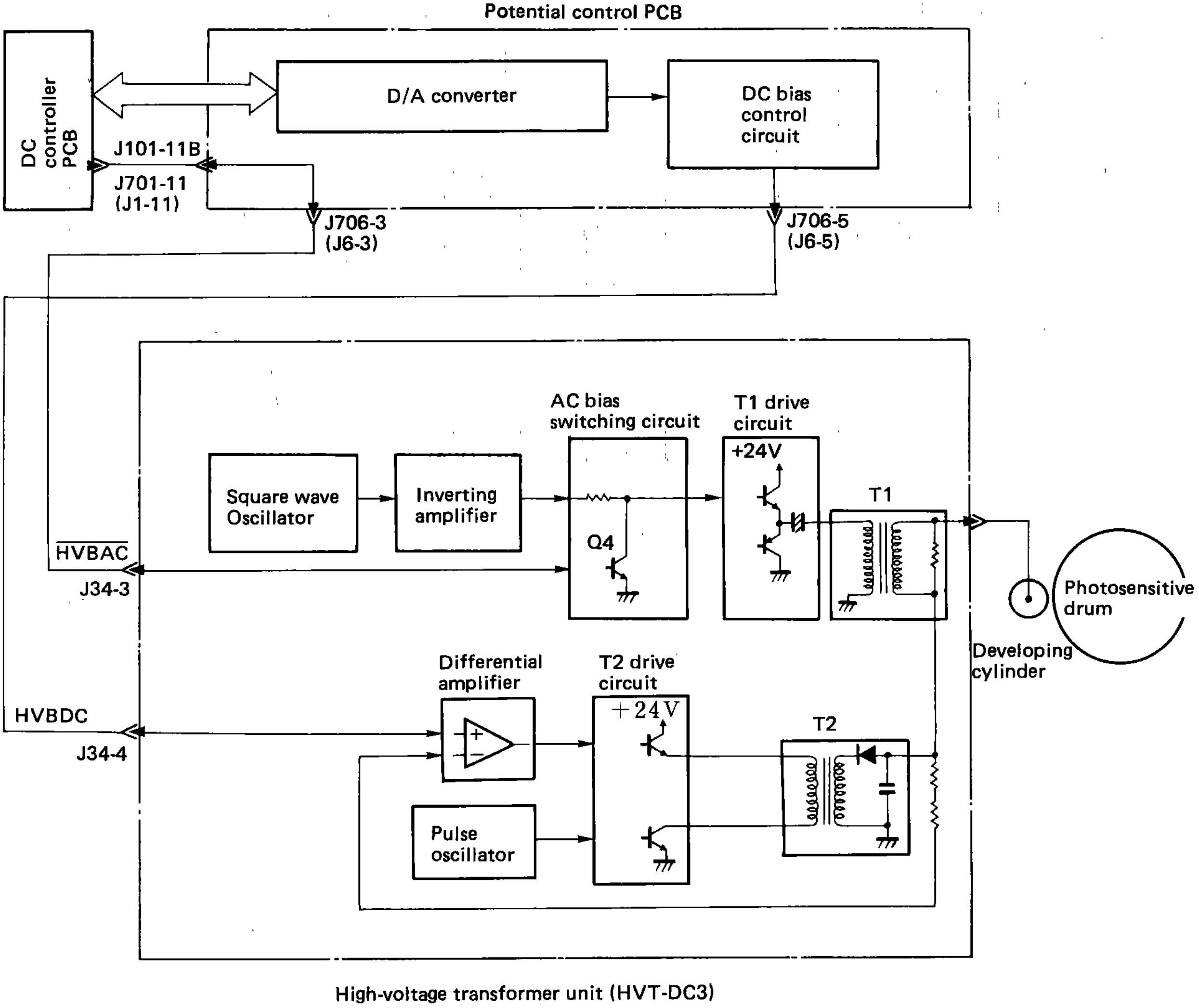

Potential control PCB
DC controller PCB
D/A converter
DC bias control circuit
J101-11B
J701-11
(J1-11)
J706-3
(J6-3)
J706-5
(J6-5)
AC bias switching circuit
T1 drive circuit
+24V
T1
Square wave Oscillator
Inverting amplifier
Q4
$\overline{\text{HVBAC}}$
J34-3
Photosensitive drum
Developing cylinder
Differential amplifier
T2 drive circuit
+24V
T2
HVBDC
J34-4
Pulse oscillator
High-voltage transformer unit (HVT-DC3)

Figure 3-33

B. Transfer Corona Current Control System

1. General

Figure 3-34 shows the transfer corona control circuit. The main functions are:

- Switching transfer corona current ON/OFF
- Switching transfer corona current

There are up to four transfers of toner onto a sheet of copy paper, one for each of the colors of toners. For each successive transfer the transfer corona current increases to increase the attraction of toner to the paper and thus ensure satisfactory transfer.

2. Transfer corona current control

The TRANSFER CORONA DRIVE command ($\overline{\text{HVTR}}$) is always 0, so the analog TRANSFER CORONA CURRENT CONTROL signal ($\overline{\text{HVTRC}}$) switches the transfer corona high-voltage transformer ON/OFF as well as determining the corona current.

- HVTRC signal output less than 16V
  - └→Pulse width modulation circuit ON
    - └→Transfer HV transformer ON
      - └→LED4 ON
- HVTRC signal output over 16V
  - └→Pulse width modulation circuit OFF
    - └→Transfer HV transformer OFF
      - └→LED4 OFF

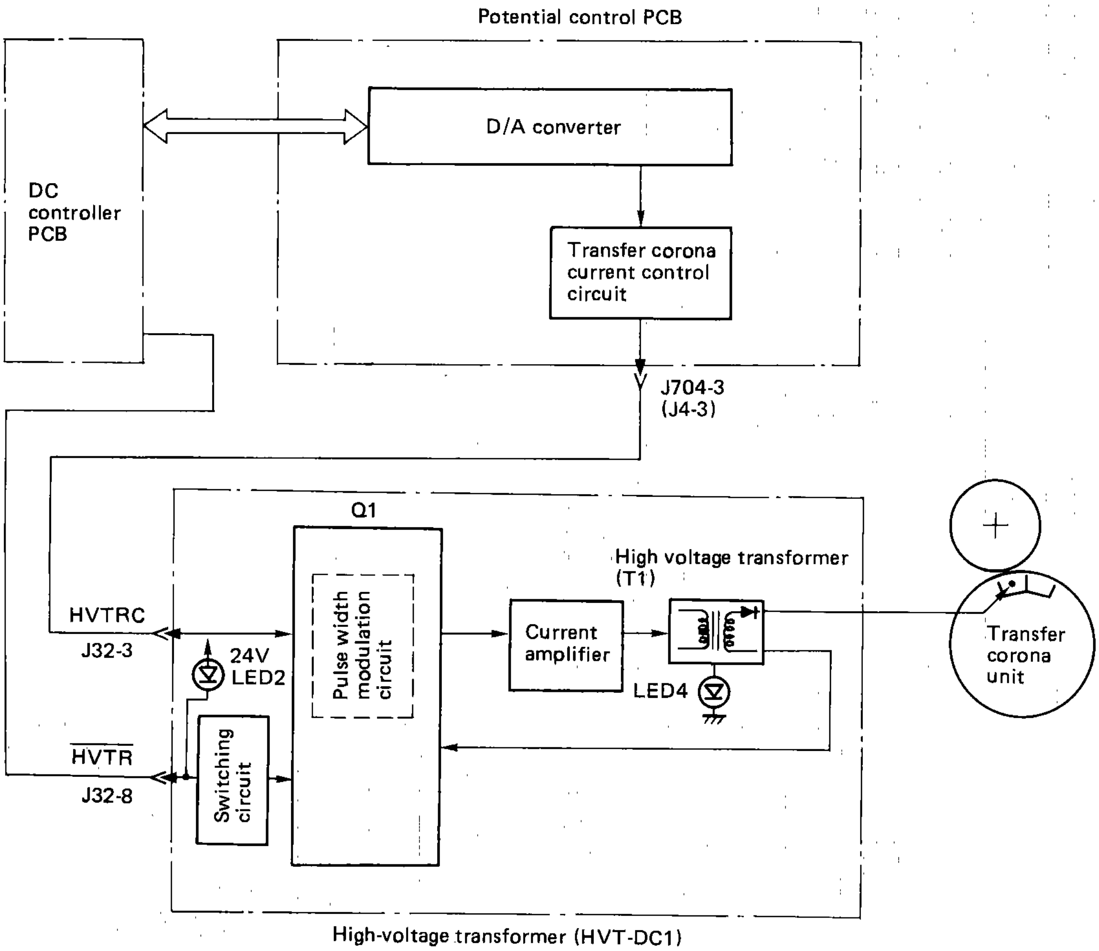

Potential control PCB
D/A converter
DC controller PCB
Transfer corona current control circuit
J704-3 (J4-3)
Q1
High voltage transformer (T1)
HVTRC
J32-3
24V
LED2
Pulse width modulation circuit
Current amplifier
LED4
Transfer corona unit
HVTR
J32-8
Switching circuit
High-voltage transformer (HVT-DC1)

Figure 3-34

C. Static Charge Eliminating Corona Current Control System

1. General

Figure 3-35 shows the static charge eliminating (SCE) corona control circuit. The main functions are:

- Static charge eliminating corona (internal and external) AC component ON/OFF
- Switching static charge eliminating corona (internal) DC component ON/OFF and controlling its voltage

2. Operation

a. Switching external and internal SCE corona AC component ON/OFF

- STATIC CHARGE ELIMINATING CORONA DRIVE command ($\overline{\text{PDCD}}$) = 1
  - ↳Switching circuit OFF
    - ↳Pulse oscillator OFF
      - ↳SCE corona HV transformer OFF
- STATIC CHARGE ELIMINATING CORONA DRIVE command ($\overline{\text{PDCD}}$) = 0
  - ↳Switching circuit ON
    - ↳Pulse oscillator ON
      - ↳SCE corona HV transformer ON

b. Switching internal SCE corona DC bias ON/OFF and controlling voltage

- SCE (INTERNAL) CORONA DC VOLTAGE CONTROL signal (PDDC) output less than 8V
  - ↳Pulse width modulation circuit OFF
    - ↳Drive circuit OFF
- SCE (INTERNAL) CORONA DC VOLTAGE CONTROL signal (PDDC) output over 8V
  - ↳Pulse width modulation circuit ON
    - ↳Drive circuit ON
    - ↳DC bias applied to internal SCE corona unit with voltage proportional to analog signal PDDC.

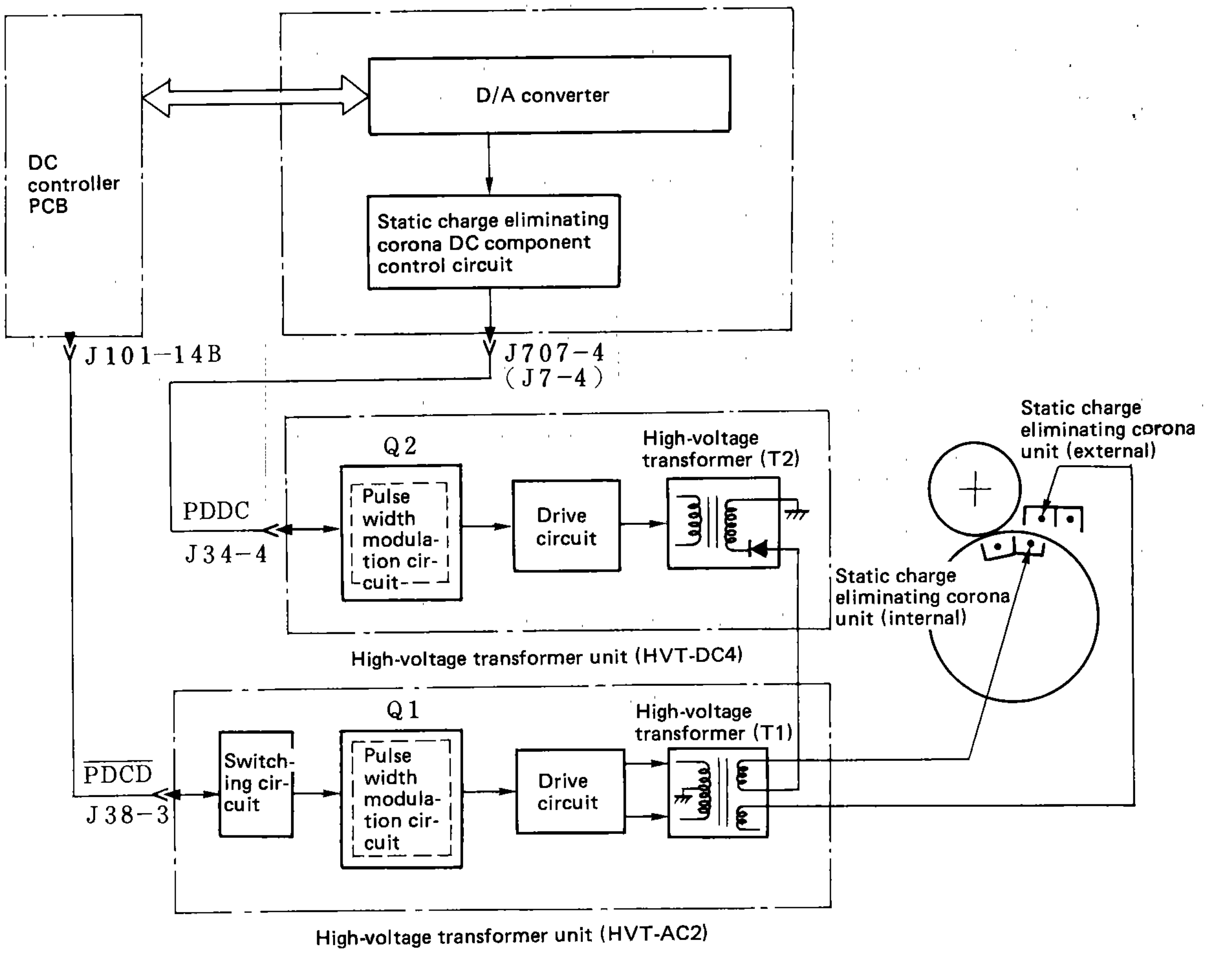

D/A converter
DC controller PCB
Static charge eliminating corona DC component control circuit
J101-14B
J707-4 (J7-4)
PDDC
J34-4
Q2
Pulse width modulation circuit
Drive circuit
High-voltage transformer (T2)
High-voltage transformer unit (HVT-DC4)
Static charge eliminating corona unit (external)
Static charge eliminating corona unit (internal)
Q1
$\overline{\text{PDCD}}$
J38-3
Switching circuit
Pulse width modulation circuit
Drive circuit
High-voltage transformer (T1)
High-voltage transformer unit (HVT-AC2)

Figure 3-35

D. Separation Corona Current Control System

1. General

The circuit shown in Figure 3-36 switches the separation corona current ON/OFF.

2. Operation

- SEPARATION CORONA DRIVE command ($\overline{HVSP}$) = 1
  - → Switching circuit OFF
    - → Pulse width modulation circuit OFF
      - → High-voltage transformer OFF
- SEPARATION CORONA DRIVE command ($\overline{HVSP}$) = 0
  - → Switching circuit ON
    - → Pulse width modulation circuit ON
      - → High-voltage transformer ON

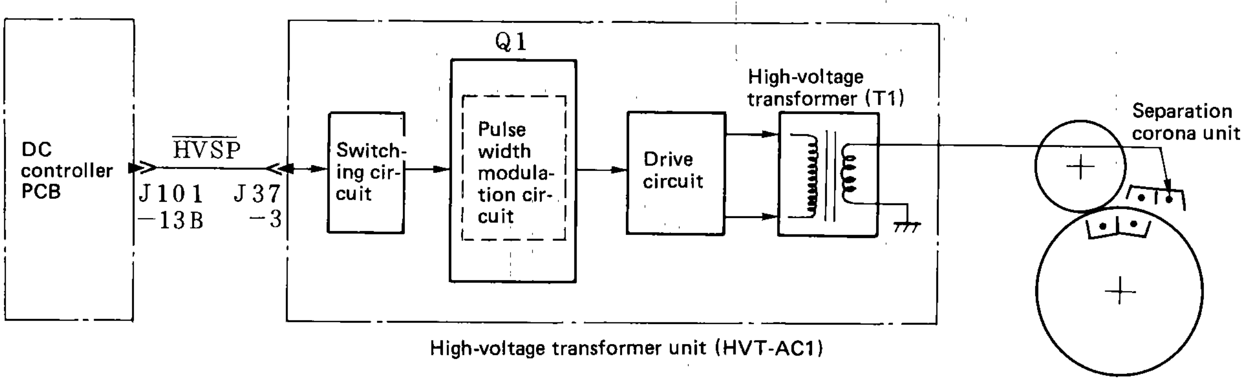

DC controller PCB
HVSP
J101 -13B
J37 -3
Q1
Switching circuit
Pulse width modulation circuit
Drive circuit
High-voltage transformer (T1)
Separation corona unit
High-voltage transformer unit (HVT-AC1)

Figure 3-36

E. Drum Temperature Control System

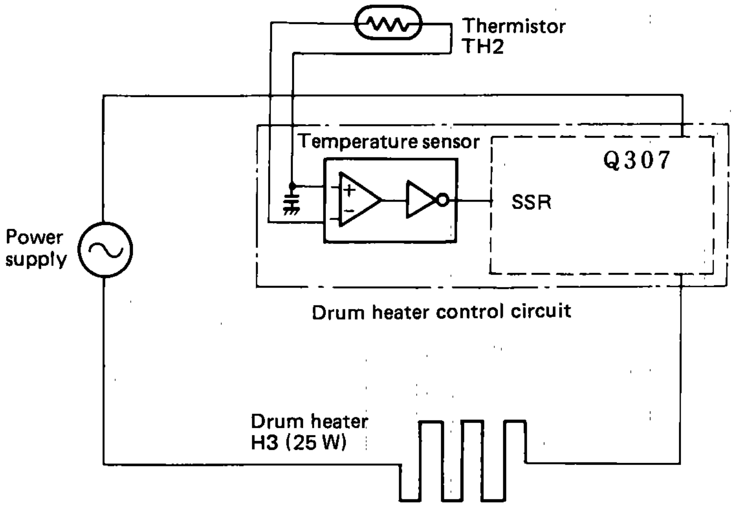
1. General

The sensitivity of the photosensitive drum varies with temperature and humidity.

A25W heater inside the drum shaft heats the drum to overcome undesirable effects.

2. Control system

Whenever the printer is plugged in, power is supplied to the drum heater control circuit whether the power switch is ON or OFF. The temperature near the drum is sensed continuously by the thermistor of the drum heater control circuit, located near the drum. If the ambient temperature near the drum is low, power is supplied to the drum heater via SSR Q307.



Thermistor
TH2
Temperature sensor
Q307
SSR
Power supply
Drum heater control circuit
Drum heater
H3 (25 W)

Figure 3-37

F. Developing Unit /Drum Cleaning Unit

1. General

The four color developing units are mounted ferris-wheel style in a turret unit. Each developing unit is rotated (by motor M4) in turn into position facing the photosensitive drum.

The developing cylinder in position against the photosensitive drum is rotated by the developing cylinder drive motor M3.

The photosensitive drum and drum cleaning unit are driven by drum drive motor M1.

The concentration of toner in the developer on the developing cylinder in position is determined by the toner concentration sensing circuit. If the concentration is low, the feedscrew that feeds toner to that unit is engaged (motor M2 driving via clutch operated) to feed toner from the hopper.

The quantity of toner in the hoppers is sensed by toner sensors Q20, 21, 22, and 23. If any is too low, the TONER OUT indicator on the control panel goes ON.

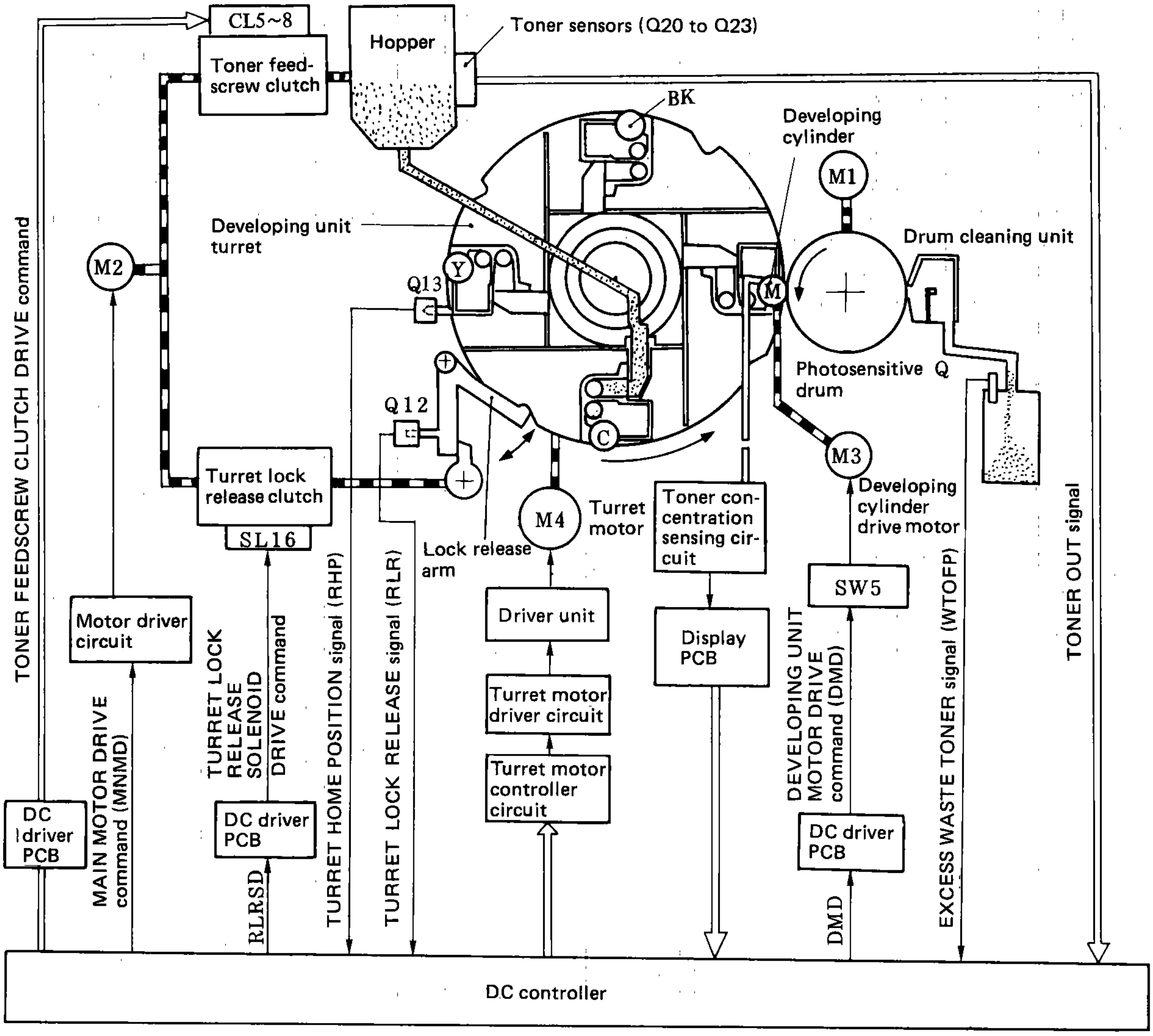

CL5~8
Toner feed-screw clutch
Hopper
Toner sensors (Q20 to Q23)
BK
Developing cylinder
M1
Drum cleaning unit
Developing unit turret
M2
Q13
Y
M
Photosensitive drum
Q
Q12
C
M3
Developing cylinder drive motor
Turret lock release clutch
SL16
M4
Turret motor
Lock release arm
Toner concentration sensing circuit
SW5
TONER FEEDSCREW CLUTCH DRIVE command
Motor driver circuit
MAIN MOTOR DRIVE command (MNMD)
DC driver PCB
TURRET LOCK RELEASE SOLENOID DRIVE command
DC driver PCB
RLRSD
TURRET HOME POSITION signal (RHP)
TURRET LOCK RELEASE signal (RLR)
Driver unit
Turret motor driver circuit
Turret motor controller circuit
Display PCB
DEVELOPING UNIT MOTOR DRIVE command (DMD)
DC driver PCB
DMD
EXCESS WASTE TONER signal (WTOFP)
TONER OUT signal
DC controller

Figure 3-38

2. Turret Motor Speed Control Circuit

a. General

Figure 3-39 shows the control circuit for the turret motor, M4. The main functions are:

1. Switching motor ON/OFF
2. Controlling turrent motor speed and position.

The turret drive motor is driven by externally generated DC pulses of the required polarity and phase. A feedback pulse train signal from a clock pulse generator indicates both the speed and position of the motor. (Behavior is much like a stepping motor).

b. Operation

1. Motor operation

   The three control signals RMRAC1, -2 and -3 indicate to the microprocessor of the turret motor controller PCB the number of revolutions that the motor must make, and the MOTOR DRIVE command RMD (= 0) causes the motor to start. Both signals are generated by the DC controller PCB. The motor controller then outputs signals RMSC0-7 to the drive control circuit to signal the required frequency of drive pulses. The drive control circuit then outputs commands RMD1-3 to the three switching circuits to cause them to operate drive (amplifier) circuits 1-3. The latter output the power pulses to drive the motor.

   The motor accelerates smoothly to its maximum, then decelerates smoothly to a stop so that the developing units are not subjected to shock. (For a quarter-turn of the turret, the motor never reaches maximum speed.)

2. Motor stopped

   When $\overline{RMD}$ = 0 and DISENABLE MOTOR signal $\overline{RMS}$ = 0, there are no drive signals.

3. Fault detection

   If the motor is overloaded, the problem is identified when CLK signal frequency does not correspond to drive pulse frequency. The speed control circuit stops sending RMSC signals, and the microprocessor sends signal MOL = 1 to the DC controller, which switches indicator E021 of the control panel ON.

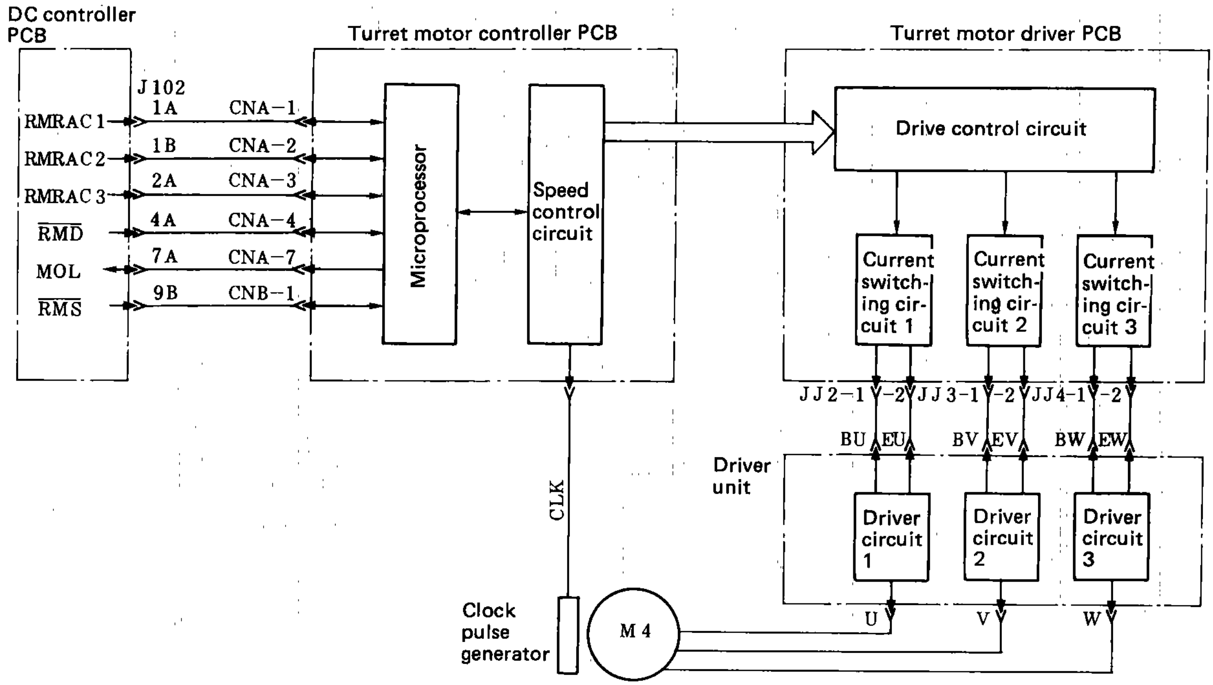

DC controller PCB
Turret motor controller PCB
Turret motor driver PCB
J102
RMRAC1
RMRAC2
RMRAC3
$\overline{RMD}$
MOL
$\overline{RMS}$
1A
1B
2A
4A
7A
9B
CNA-1
CNA-2
CNA-3
CNA-4
CNA-7
CNB-1
Microprocessor
Speed control circuit
Drive control circuit
Current switching circuit 1
Current switching circuit 2
Current switching circuit 3
JJ2-1
-2
JJ3-1
-2
JJ4-1
-2
BU
EU
BV
EV
BW
EW
Driver unit
Driver circuit 1
Driver circuit 2
Driver circuit 3
CLK
Clock pulse generator
M4
U
V
W

Figure 3-39

3. Toner Concentration Sensing Circuit

a. General

The concentration of toner in the developer on the developing cylinder is sensed by a system of a lamp and a photodiode that responds to both blue and infrared light and optical filters. The lamp shines on the developer and the reflected light passes first through a blue, then an infrared, filter (selected by SL21). Both toner and iron reflect blue light, so this provides a reference value which is stored in memory. Iron powder absorts infrared, so the amount of radiation passing the IR (seemingly black) filter gives a measure of toner concentration when compared with the reference value.

If the concentration is low, the circuit sends the appropriate TONER SUPPLY command (YTSC, MTSC, CTSC, or BKTSC), and toner is fed from the hopper unit of the required color.

There is only one toner concentration sensing system. It senses the concentration only of toner in the developer in the developing unit then in position for operation.

Reference

The toner sensors of the hopper units are piezoelectric oscillators when there is no toner touching one, it oscillates at a frequency of several KHz and the sensor output is LOW. If there is toner in contact, its pressure prevents oscillation, and sensor output is HIGH.

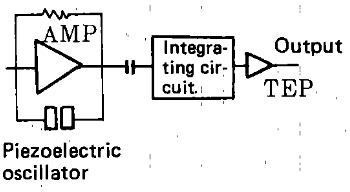

AMP
Integrating circuit
Output
TEP
Piezoelectric oscillator

Figure 3-40

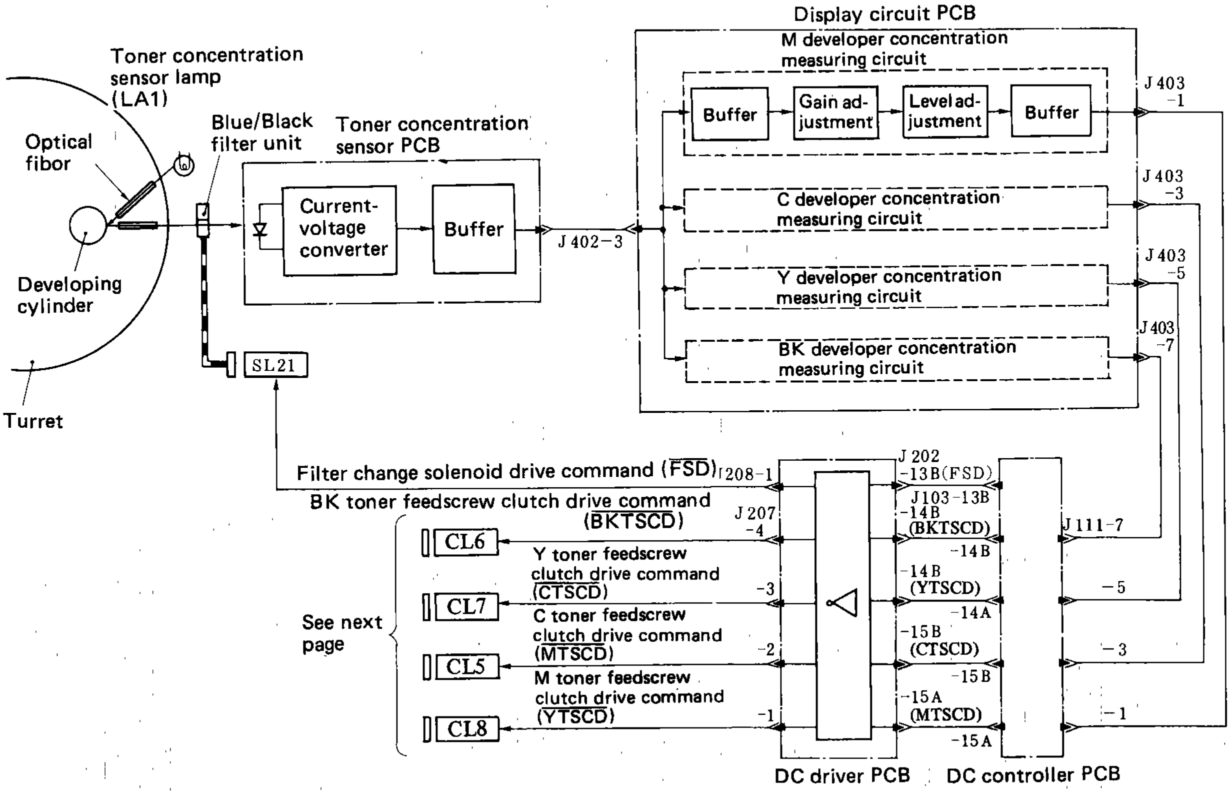

Display circuit PCB
M developer concentration measuring circuit
Buffer
Gain adjustment
Level adjustment
Buffer
J403 -1
C developer concentration measuring circuit
J403 -3
Y developer concentration measuring circuit
J403 -5
BK developer concentration measuring circuit
J403 -7
Toner concentration sensor lamp (LA1)
Blue/Black filter unit
Toner concentration sensor PCB
Optical fibor
Current-voltage converter
Buffer
J402-3
Developing cylinder
SL21
Turret
Filter change solenoid drive command (FSD)
J208-1
BK toner feedscrew clutch drive command (BKTSCD)
J207 -4
CL6
Y toner feedscrew clutch drive command (CTSCD)
-3
CL7
C toner feedscrew clutch drive command (MTSCD)
-2
CL5
M toner feedscrew clutch drive command (YTSCD)
-1
CL8
See next page
J202 -13B(FSD)
J103-13B
-14B (BKTSCD)
-14B
-14B (YTSCD)
-14A
-15B (CTSCD)
-15B
-15A (MTSCD)
-15A
J111-7
-5
-3
-1
DC driver PCB
DC controller PCB

Figure 3-41

Photodiode

4. Toner Supply Replenishment/Turret Operation

Toner is added to a developing unit when the ratio of toner to carrier (toner concentration) becomes too low. However, toner is not supplied to the developing unit in operation, but to the one underneath the axle of the turret unit, as explained below.

Toner is moved from a hopper, through the axle, to a developing unit by a spring-type feedscrew driven by motor M2 via a solenoid-actuated spring clutch.

At the point during a copying cycle represented by Figure 3-43, the M developing unit is in operating position, and development by the Y, BK and M developing units has been completed. The toner concentration in each has been measured and stored in memory.

As the next step, the turret rotates CCW (Figure 3-43-b) to move the C developing unit into operating position. This places the Y developing assembly below the axle, and toner is fed to it in the amount required (determined by the earlier concentration measurement) as shown in Figure 3-43.

While Y toner is being added, the concentration of toner in the C developing unit is measured and toner will be added to it later (if necessary).

M toner will be fed to the M developing unit when that unit is in position below the shaft.

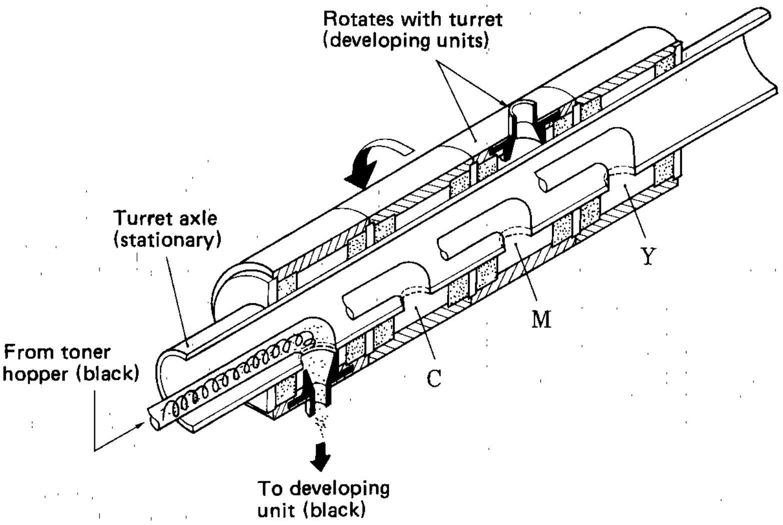
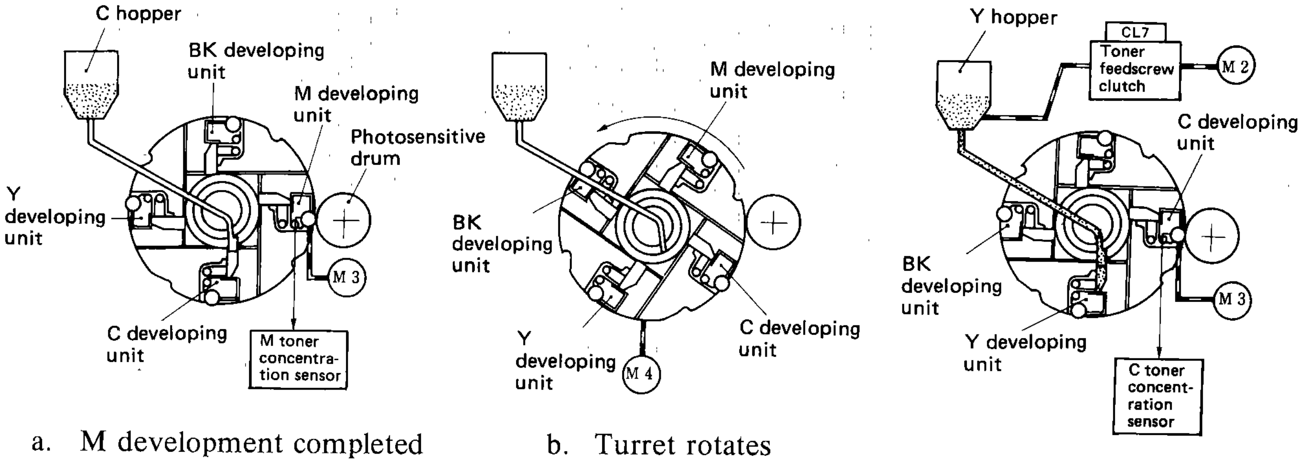

Rotates with turret
(developing units)
Turret axle
(stationary)
Y
M
From toner
hopper (black)
C
To developing
unit (black)

Figure 3-42 Toner feed unit (cross section)


C hopper
BK developing unit
M developing unit
Photosensitive drum
Y developing unit
M 3
C developing unit
M toner concentration sensor
M developing unit
BK developing unit
Y developing unit
M 4
C developing unit
Y hopper
CL7
Toner feedscrew clutch
M 2
C developing unit
BK developing unit
M 3
Y developing unit
C toner concentration sensor

a. M development completed

b. Turret rotates

c. C development, C waste toner sensing, and feeding Y toner

Figure 3-43

The turret returns to its HOME position at the end of a copying operation in preparation for making the next copy repeatly.

In the case of making R copies (M + Y) or three-color copies (M + C + Y) on A4/Letter paper, the toners listed below are not replenished, so copy image quality would drop. To prevent this problem, the turret makes one complete rotation after every seven copies in order to replenish toner. (Toner is not replenished after each copy is made because it would prolong copying time).

Colors of copy	Toner not supplied
R (M+Y)	M toner
Three colors (M+C+Y)	M toner

Table 3-5

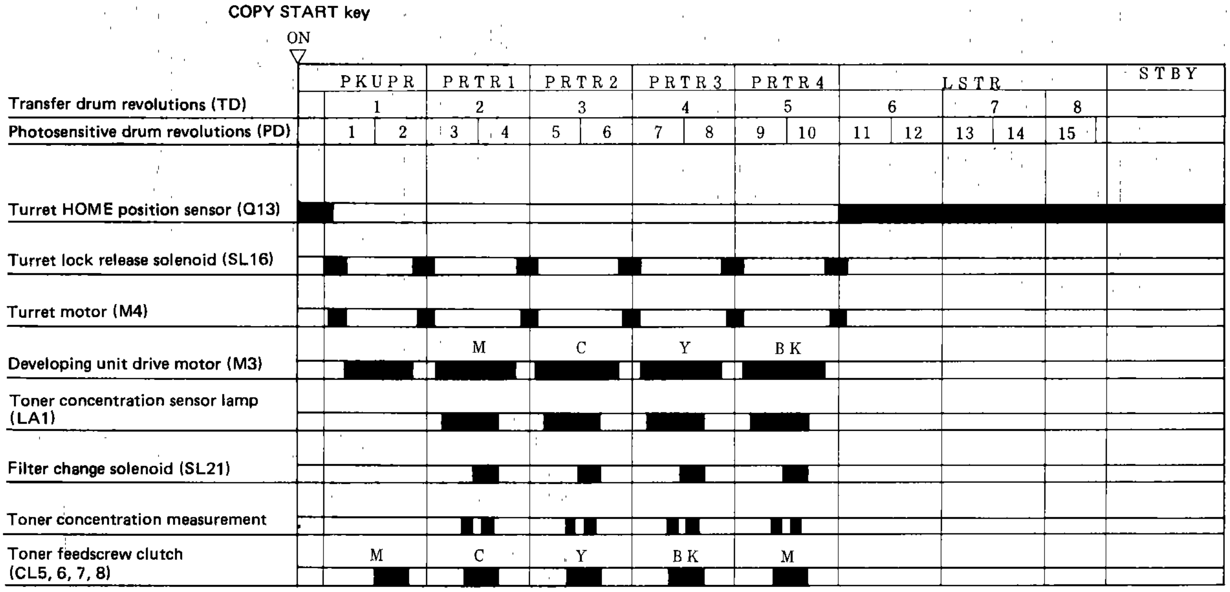

COPY START key
ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
STBY
Transfer drum revolutions (TD)
1
2
3
4
5
6
7
8
Photosensitive drum revolutions (PD)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Turret HOME position sensor (Q13)
Turret lock release solenoid (SL16)
Turret motor (M4)
Developing unit drive motor (M3)
M
C
Y
BK
Toner concentration sensor lamp (LA1)
Filter change solenoid (SL21)
Toner concentration measurement
Toner feedscrew clutch (CL5, 6, 7, 8)
M
C
Y
BK
M

Figure 3-44 A4/Letter/full color/first copy

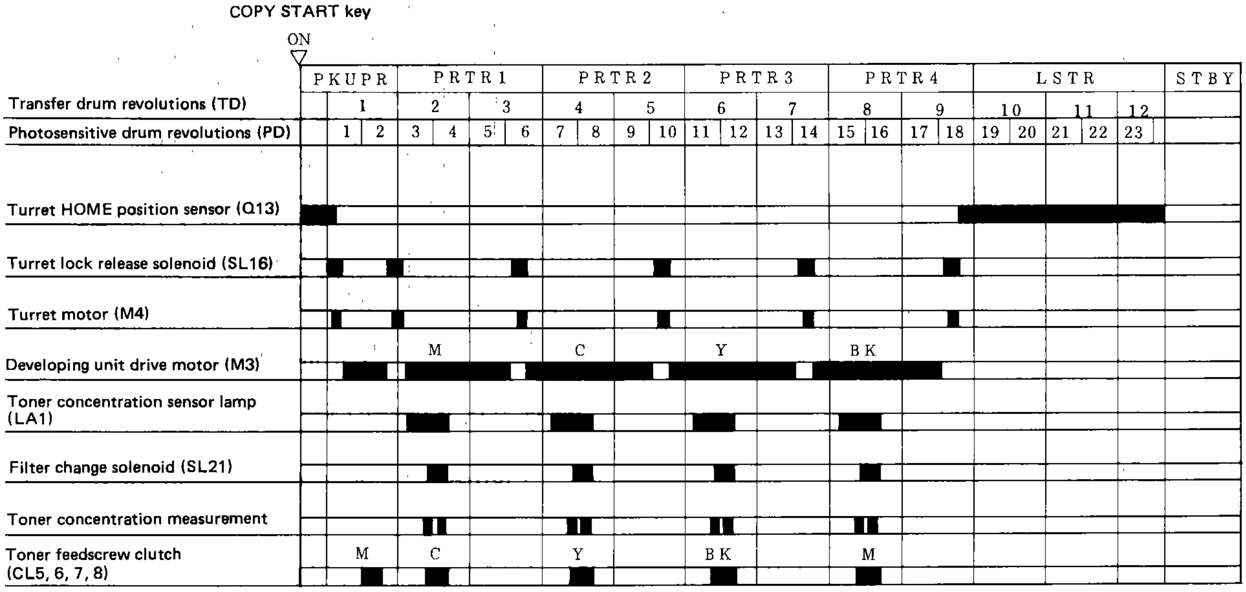

COPY START key
ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
STBY
Transfer drum revolutions (TD)
1
2
3
4
5
6
7
8
9
10
11
12
Photosensitive drum revolutions (PD)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Turret HOME position sensor (Q13)
Turret lock release solenoid (SL16)
Turret motor (M4)
Developing unit drive motor (M3)
M
C
Y
BK
Toner concentration sensor lamp (LA1)
Filter change solenoid (SL21)
Toner concentration measurement
Toner feedscrew clutch (CL5, 6, 7, 8)
M
C
Y
BK
M

Figure 3-45 Other than A4/Letter/full color/first copy

5. Developing Unit Drive Motor Control System

a. Operation

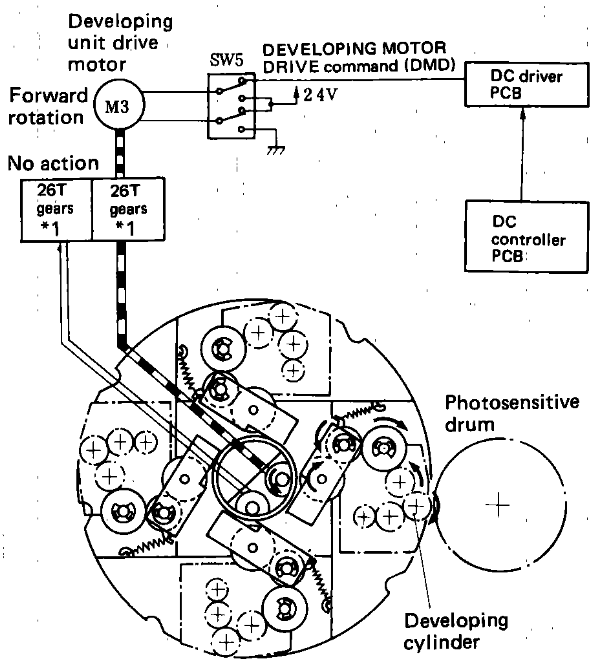
The developing cylinder of each developing unit is operated by the developing unit drive motor, M3, when the developing unit is in operating position.

The development unit motor is switched ON/OFF by the DEVELOPING UNIT MOTOR DRIVE command DMD from the DC controller.

b. Removing Developer

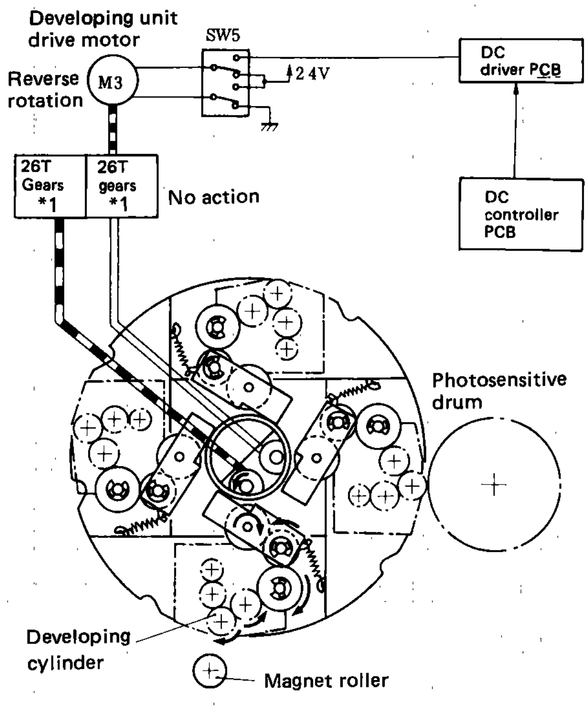
If the developer in a developing unit must be changed (due to contamination, etc.), the operation can be performed virtually automatically. The developing assembly to be emptied is first positioned in the bottom location, then SW5 is switched ON manually.

This causes the developing cylinder at the bottom position to rotate, and feed the developer out of the developing unit where it is attracted to the internal magnet of the magnet roller (which is rotating).


Developing unit drive motor
SW5
DEVELOPING MOTOR DRIVE command (DMD)
DC driver PCB
Forward rotation
M3
24V
No action
26T gears *1
26T gears *1
DC controller PCB
Photosensitive drum
Developing cylinder

*1 With one-way clutch

Figure 3-46 During copying


Developing unit drive motor
SW5
Reverse rotation
M3
24V
DC driver PCB
26T Gears *1
26T gears *1
No action
DC controller PCB
Photosensitive drum
Developing cylinder
Magnet roller

*1 with one-way clutch

Figure 3-47 Removing waste developer

G. Primary Corona Wire Cleaning System

1. General

A cleaning unit automatically cleans the primary corona wire. It operates:

1. Every time the main switch is set ON provided that the temperature of the fixing assembly is under 100°C.
2. When the printer is set to the Service mode and a command is issued to clean the primary corona wire.

2. Primary Corona Wire Cleaning

The primary corona wire cleaning unit drive motor M12 runs in the forward direction for about 25 s to driving the cleaner forward, reverses for about 25 s to return the cleaning unit, then stops.

Reference

M12 runs forward when $\overline{CLMD} = 0$ and $\overline{CLMF} = 0$.

M12 runs in reverse when $\overline{CLMD} = 0$ and $\overline{CLMF} = 1$.

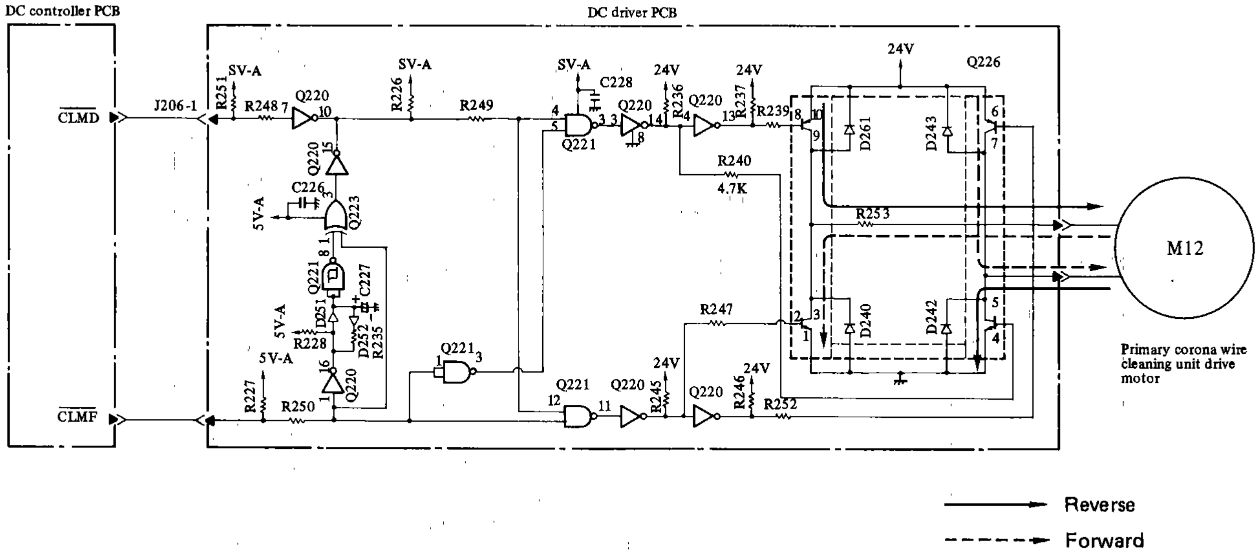

DC controller PCB
DC driver PCB
CLMD
CLMF
J206-1
5V-A
24V
R251
R248
R249
R226
R250
R227
R228
R235
R236
R237
R239
R240
4.7K
R245
R246
R247
R252
R253
Q220
Q221
Q223
Q226
C226
C227
C228
D251
D252
D240
D242
D243
D261
M12
Primary corona wire cleaning unit drive motor
Reverse
Forward

Figure 3-49

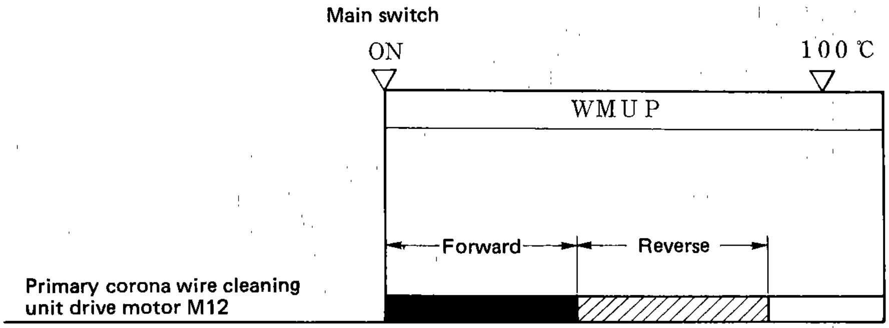

Main switch
ON
100 ℃
WMUP
Forward
Reverse
Primary corona wire cleaning unit drive motor M12

Figure 3-50

IV. PAPER PICK-UP AND FEED SYSTEM

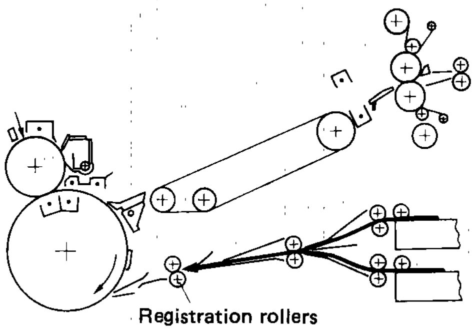
A. General

When pick-up roller clutch CL3 or CL4 is actuated, the pick-up roller rotates and advances one sheet of copy paper from a cassette into the printer.

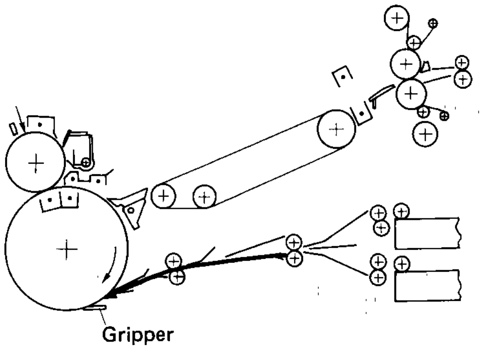
The sheet is advanced by the feed rollers to the registration rollers, which are stationary at that time.

The registration rollers begin to turn at the time that will feed the paper to the transfer drum so that the leading edge of the paper contacts the grippers of the drum. The grippers then close and hold the paper to the drum through the various transfer operations (up to four). When all toner has been transferred to the paper the grippers open and the copy paper is separated from the drum by the separation claw.

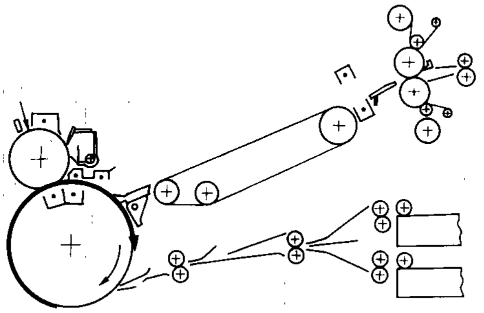
The copy paper is then transported to the fixing assembly by the feeder belt and finally delivered to the copy tray.



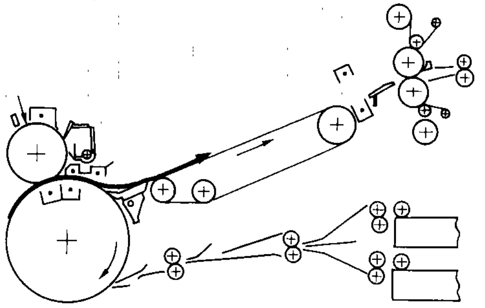
① Paper pick up



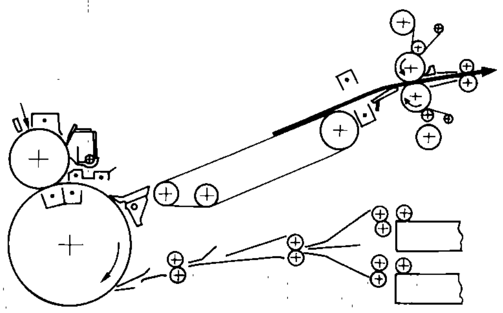
② Gripper operation



③ Toner image transfer



④ Separation and feed

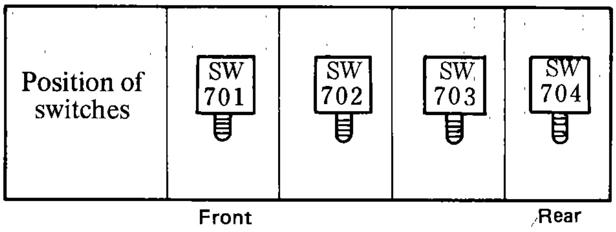


⑤ Fixing and delivery

Figure 3-51

B. Sensing Cassette Size

The control system identifies the persence/size of a cassette by the combination of switches actuated as shown in Table 3-6 by cams on the cassette.



	Cassette size	Switch			
		SW701	SW702	SW703	SW704
1	A4	OFF	OFF	ON	ON
2	B5R	OFF	ON	OFF	OFF
3	B4	OFF	ON	OFF	ON
4	A4R	OFF	ON	ON	OFF
5	A3	OFF	ON	ON	ON
6	Letter	ON	OFF	ON	ON
7	Legal	ON	ON	OFF	ON
8	Letter R	ON	ON	ON	OFF
9	Ledger	ON	ON	ON	ON
10	Cassette not present	OFF	OFF	OFF	OFF

Table 3-6

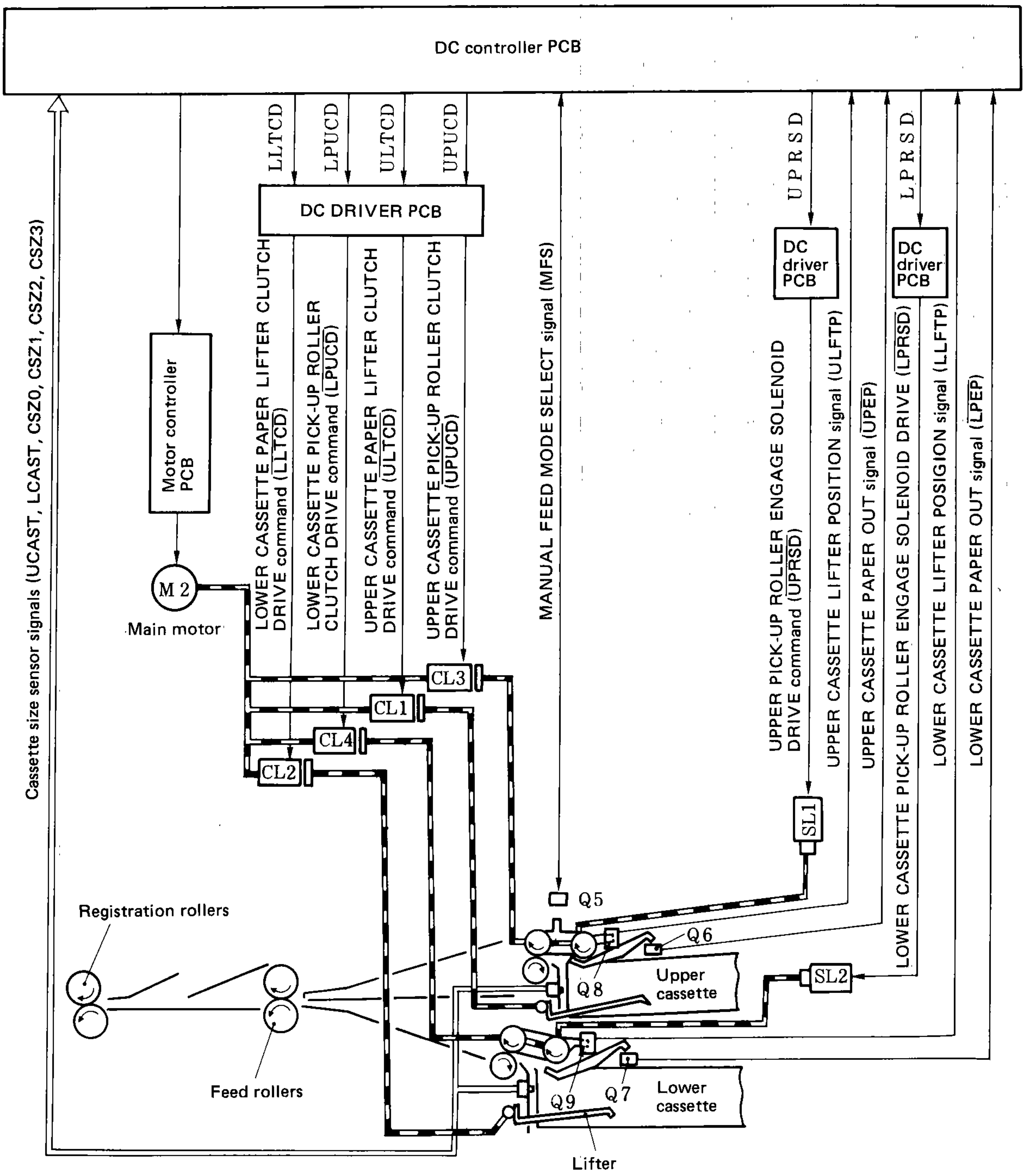
C. Pick-up from a Cassette

When the COPY START key is pressed, paper sensors Q8 and Q9 indicate if the lifters are at the lowered position. If so lifter cam clutches CL1 and CL2 go ON and the cams raise the lifters until the paper is detected by stack height sensors Q6 and Q7.

If there is no signal from Q6 or Q7, the DC controller recognizes that there is no paper in the cassette and sends a PAPER OUT message which is displayed on the control panel.

If there is paper in the cassette, pick-up roller clutch, CL3 or CL4 goes ON and paper is fed. 0.35 s later, the pick-up roller release solenoid SL1 or SL2 goes ON and lifts the pick-up roller off the paper in the cassette. Copy paper is drawn fully into the printer by the feed rollers and advanced to the registration rollers.

As paper is withdrawn from the cassette, the height decreases until the PAPER SENSOR signal becomes zero. The lifter cam clutch for that cassette then goes ON and the cam raises the lifter. 0.1 s after the paper is detected, the clutch goes OFF.



DC controller PCB
LLTCD
LPUCD
ULTCD
UPUCD
DC DRIVER PCB
UPRSD
LPRSD
DC driver PCB
DC driver PCB
Cassette size sensor signals (UCAST, LCAST, CSZ0, CSZ1, CSZ2, CSZ3)
Motor controller PCB
M 2
Main motor
LOWER CASSETTE PAPER LIFTER CLUTCH DRIVE command (LLTCD)
LOWER CASSETTE PICK-UP ROLLER CLUTCH DRIVE command (LPUCD)
UPPER CASSETTE PAPER LIFTER CLUTCH DRIVE command (ULTCD)
UPPER CASSETTE PICK-UP ROLLER CLUTCH DRIVE command (UPUCD)
MANUAL FEED MODE SELECT signal (MFS)
UPPER PICK-UP ROLLER ENGAGE SOLENOID DRIVE command (UPRSD)
UPPER CASSETTE LIFTER POSITION signal (ULFTP)
UPPER CASSETTE PAPER OUT signal (UPEP)
LOWER CASSETTE PICK-UP ROLLER ENGAGE SOLENOID DRIVE (LPRSD)
LOWER CASSETTE LIFTER POSIGION signal (LLFTP)
LOWER CASSETTE PAPER OUT signal (LPEP)
CL3
CL1
CL4
CL2
SL1
SL2
Q5
Q6
Q8
Q9
Q7
Upper cassette
Lower cassette
Registration rollers
Feed rollers
Lifter

Figure 3-52

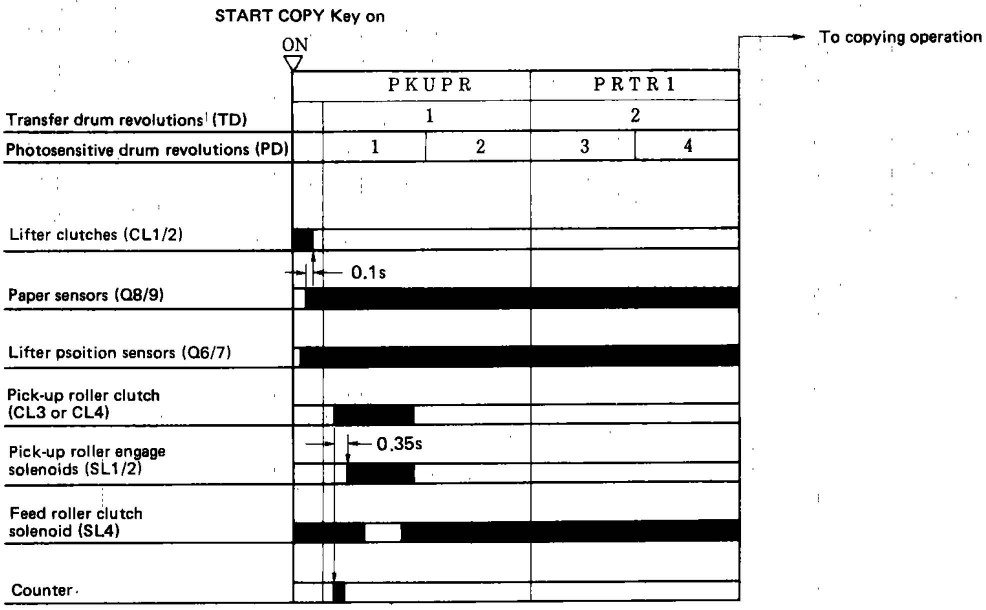

START COPY Key on
ON
To copying operation
PKUPR
PRTR1
Transfer drum revolutions (TD)
1
2
Photosensitive drum revolutions (PD)
1
2
3
4
Lifter clutches (CL1/2)
0.1s
Paper sensors (Q8/9)
Lifter psoition sensors (Q6/7)
Pick-up roller clutch (CL3 or CL4)
0.35s
Pick-up roller engage solenoids (SL1/2)
Feed roller clutch solenoid (SL4)
Counter

Figure 3-53

D. Manual Paper Feed

When the manual feed lever is pushed down, a MANUAL PAPER FEED signal (MFS) is inputted to the DC controller.

When a sheet of copy paper is placed on the manual feed tray and the COPY START key is pressed, the upper cassette pick-up roller engage solenoid (SL1) goes ON and raises the pick-up guide plate.

The copy paper is then drawn into printer by the pick-up rollers to the feed rollers.

At this point, the OHP film sensor system Q19 and lamp determines whether the copy paper is an OHP sheet or copy paper and the speed of the feeder and fixing unit set accordingly. Speed is reduced for OHP film.

If the size of copy paper has not been selected, the length is also determined by the OHP film sensor to set the length scanned in the vertical scan direction.

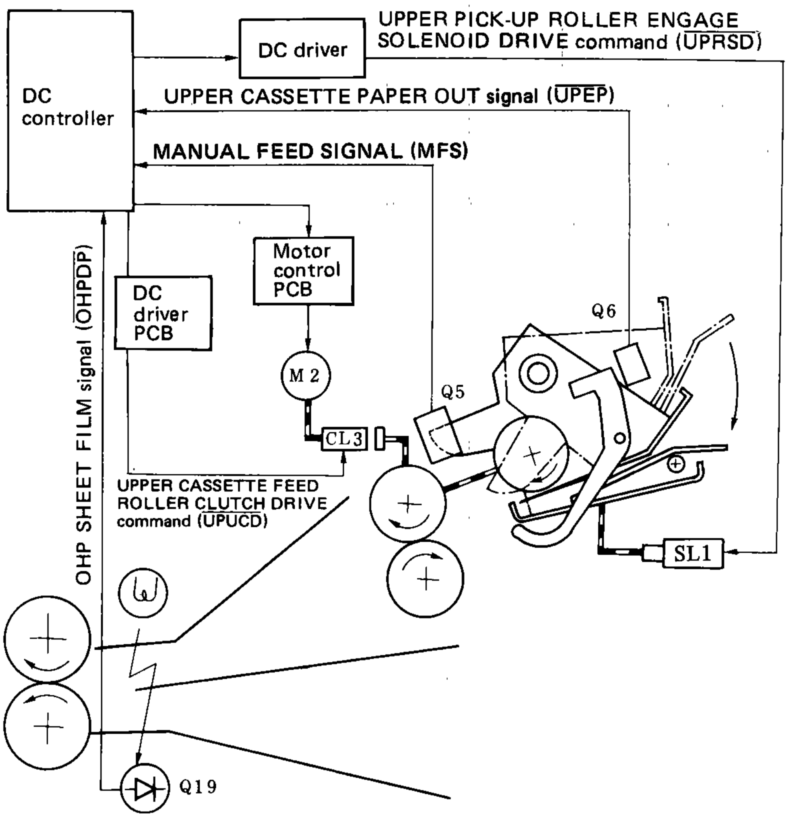

DC controller
DC driver
UPPER PICK-UP ROLLER ENGAGE SOLENOID DRIVE command ($\overline{\text{UPRSD}}$)
UPPER CASSETTE PAPER OUT signal ($\overline{\text{UPEP}}$)
MANUAL FEED SIGNAL (MFS)
OHP SHEET FILM signal ($\overline{\text{OHPDP}}$)
DC driver PCB
Motor control PCB
M 2
CL3
Q6
Q5
SL1
UPPER CASSETTE FEED ROLLER CLUTCH DRIVE command ($\overline{\text{UPUCD}}$)
Q19

Figure 3-54

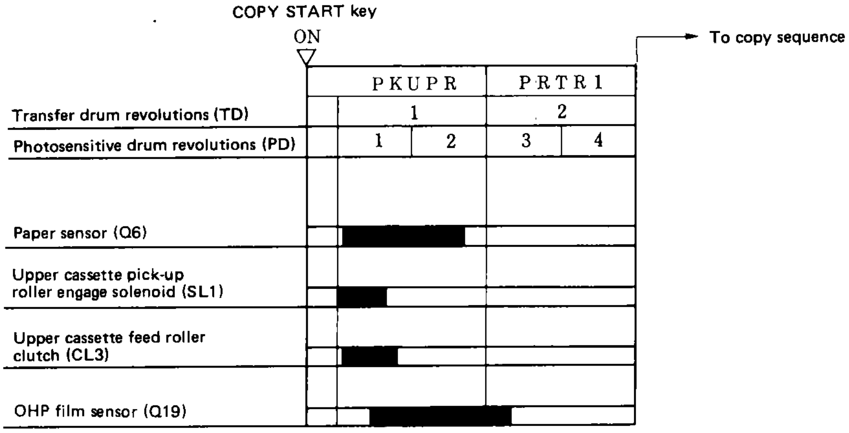


Figure 3-55

E. Transfer Drum Control System

1. General

Figure 3-56 shows the configuration of the transfer drum unit.

The copy paper is held on to the transfer drum by the grippers. After all toner has been transferred to the paper (a miximum of four times, once for each color of toner) the paper is sent to the fixing unit.

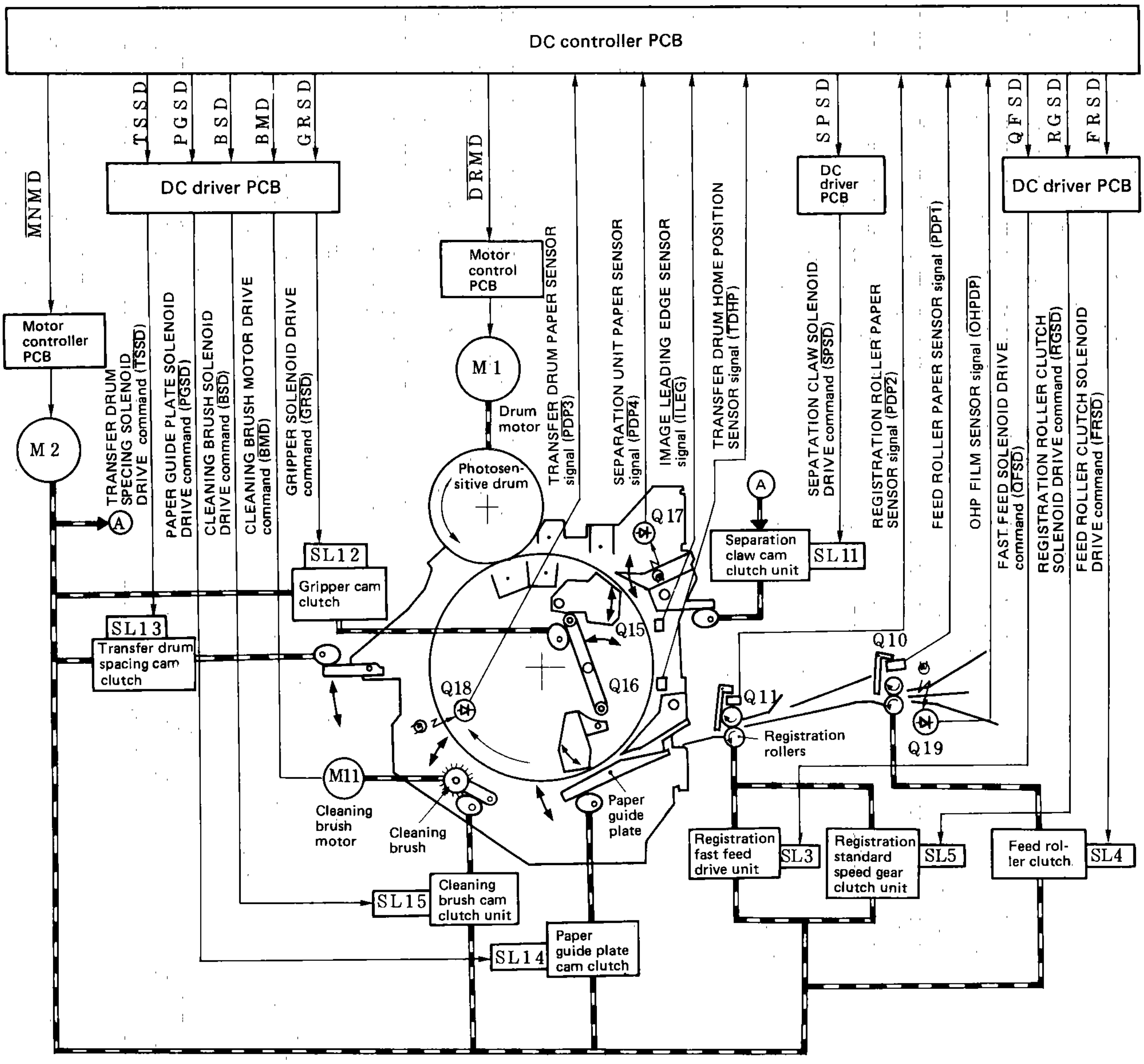

DC controller PCB
MNMD
TSSD
PGSD
BSD
BMD
GRSD
DC driver PCB
DRMD
SPSD
DC driver PCB
QFSD
RGSD
FRSD
DC driver PCB
Motor controller PCB
M 2
TRANSFER DRUM SPECING SOLENOID DRIVE command (TSSD)
PAPER GUIDE PLATE SOLENOID DRIVE command (PGSD)
CLEANING BRUSH SOLENOID DRIVE command (BSD)
CLEANING BRUSH MOTOR DRIVE command (BMD)
GRIPPER SOLENOID DRIVE command (GRSD)
Motor control PCB
M 1
Drum motor
Photosensitive drum
TRANSFER DRUM PAPER SENSOR signal (PDP3)
SEPARATION UNIT PAPER SENSOR signal (PDP4)
IMAGE LEADING EDGE SENSOR signal (ILEG)
TRANSFER DRUM HOME POSITION SENSOR signal (TDHP)
SEPATATION CLAW SOLENOID DRIVE command (SPSD)
REGISTRATION ROLLER PAPER SENSOR signal (PDP2)
FEED ROLLER PAPER SENSOR signal (PDP1)
OHP FILM SENSOR signal (OHPDP)
FAST FEED SOLENOID DRIVE command (QFSD)
REGISTRATION ROLLER CLUTCH SOLENOID DRIVE command (RGSD)
FEED ROLLER CLUTCH SOLENOID DRIVE command (FRSD)
A
SL12
Gripper cam clutch
SL13
Transfer drum spacing cam clutch
Q17
A
Separation claw cam clutch unit
SL11
Q15
Q16
Q18
Q10
Q11
Registration rollers
Q19
M11
Cleaning brush motor
Cleaning brush
Paper guide plate
Registration fast feed drive unit
SL3
Registration standard speed gear clutch unit
SL5
Feed roller clutch
SL4
SL15
Cleaning brush cam clutch unit
SL14
Paper guide plate cam clutch

Figure 3-56

2. Registration Roller Operation

When a sheet of paper is fed to the registration rollers by the feed rollers, the registration rollers are stationary. The paper arches slightly, aligning its leading edge along the rollers. The registration rollers begin to turn at the moment that will position the leading edge at the guide plate just as the gripper passes. The gripper is opened by its cam just after passing the leading edge of the paper, and the speed of the paper is doubled long enough to advance the paper under the lip of the gripper. The gripper then closes on the paper, fast feed stops, and the gripper holds the paper while it wraps around the drum.

Ref: The fast-feed mechanism is a second clutch and gearset in parallel with the main clutch and drive unit. The gear ratio of the fast-feed gearset drivers the registration rollers at twice their normal speed. A one-way clutch in the main drive unit allows the unit to drive the rollers when the fast-feed unit is not operating, and disengages the rollers from the main drive unit, allowing them to turn faster, when the fast-feed drive unit operates.

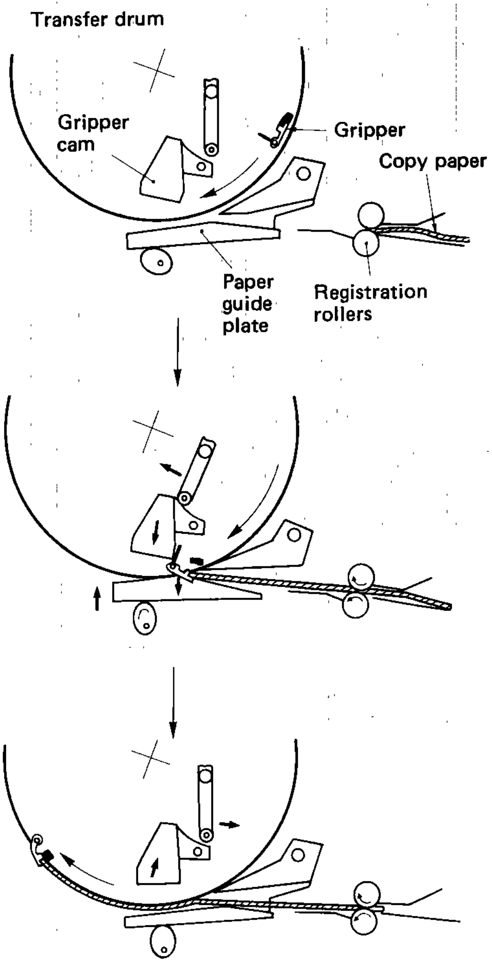


Figure 3-57

3. Transfer Drum Operation

After copying is complete, the transfer drum stops at the point where the grippers contact the photosensitive drum.

When copying starts, the transfer drum turns until a TRANSFER DRUM HOME POSITION signal (TDHP) is generated. AT this point, the PICK-UP ROTATION (PKUPR) begins.

When copies are being made on paper of a size larger than A4/Letter, the following processes also occur.

One color developing and transfer is performed during the first rotation of th transfer drum.

The second rotation of the transfer drum is idle rotation. If the transfer drum contacted the photosensitive drum at this time, the toner already transferred to copy paper could be transferred back to the photosensitive drum. To prevent this, the transfer drum spacing cam is turned (driven by motor M2 via a clutch operated by SL13) to separate the transfer drum from the photosensitive drum until the next transfer operation. (The transfer drum continues rotating.)

Reference

On the second rotation of the transfer drum, the developing unit turret is rotated to bring the next developing unit into position.

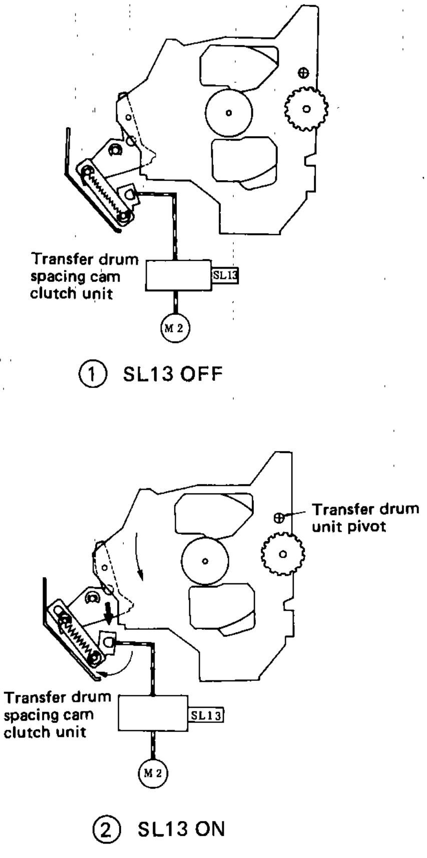
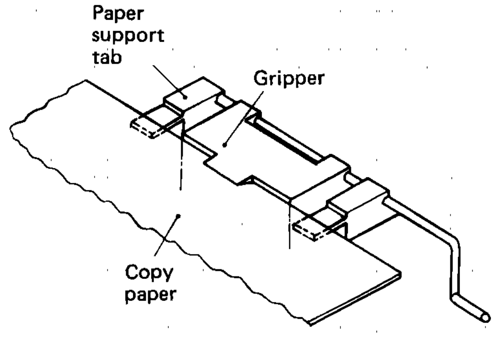

Transfer drum spacing cam clutch unit
SL13
M2
① SL13 OFF
Transfer drum unit pivot
Transfer drum spacing cam clutch unit
SL13
M2
② SL13 ON

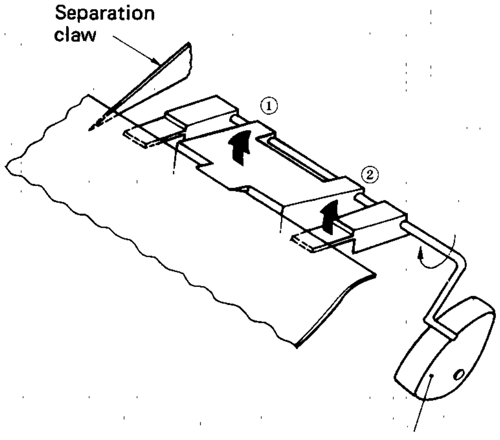
Figure 3-58

4. Separation

When transfer is completed, gripper solenoid SL12 goes ON. This releases the gripper and causes the paper support tabs to lift the end of the copy paper. Simultaneously, separation claw solenoid SL11 goes ON bringing the separation claw into contact with the transfer drum. Where it lifts the end of the copy paper away from the transfer drum.



① During transfer



② For separation

Figure 3-59

5. Transfer Drum Cleaning

The sheet of the transfer drum is cleaned by a rotating brush (driven by brush motor M11) external to the transfer drum. This brush is brought into contact with the sheet by brush solenoid SL15, and it cleans the sheet as it rotates.

6. Sequence of Operations

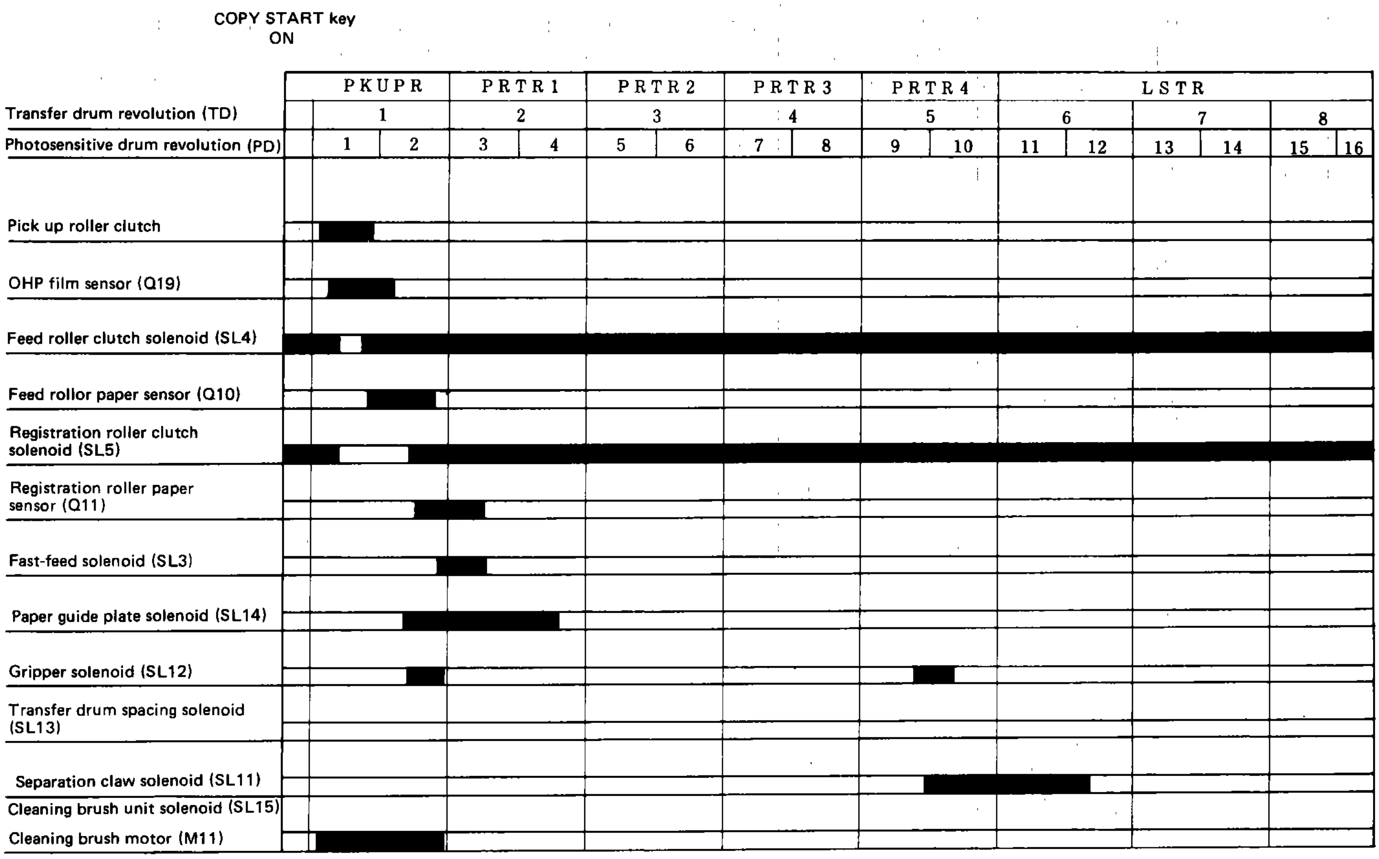

COPY START key
ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
Transfer drum revolution (TD)
1
2
3
4
5
6
7
8
Photosensitive drum revolution (PD)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Pick up roller clutch
OHP film sensor (Q19)
Feed roller clutch solenoid (SL4)
Feed rollor paper sensor (Q10)
Registration roller clutch solenoid (SL5)
Registration roller paper sensor (Q11)
Fast-feed solenoid (SL3)
Paper guide plate solenoid (SL14)
Gripper solenoid (SL12)
Transfer drum spacing solenoid (SL13)
Separation claw solenoid (SL11)
Cleaning brush unit solenoid (SL15)
Cleaning brush motor (M11)

Figure 3-60 A4/Letter/full color

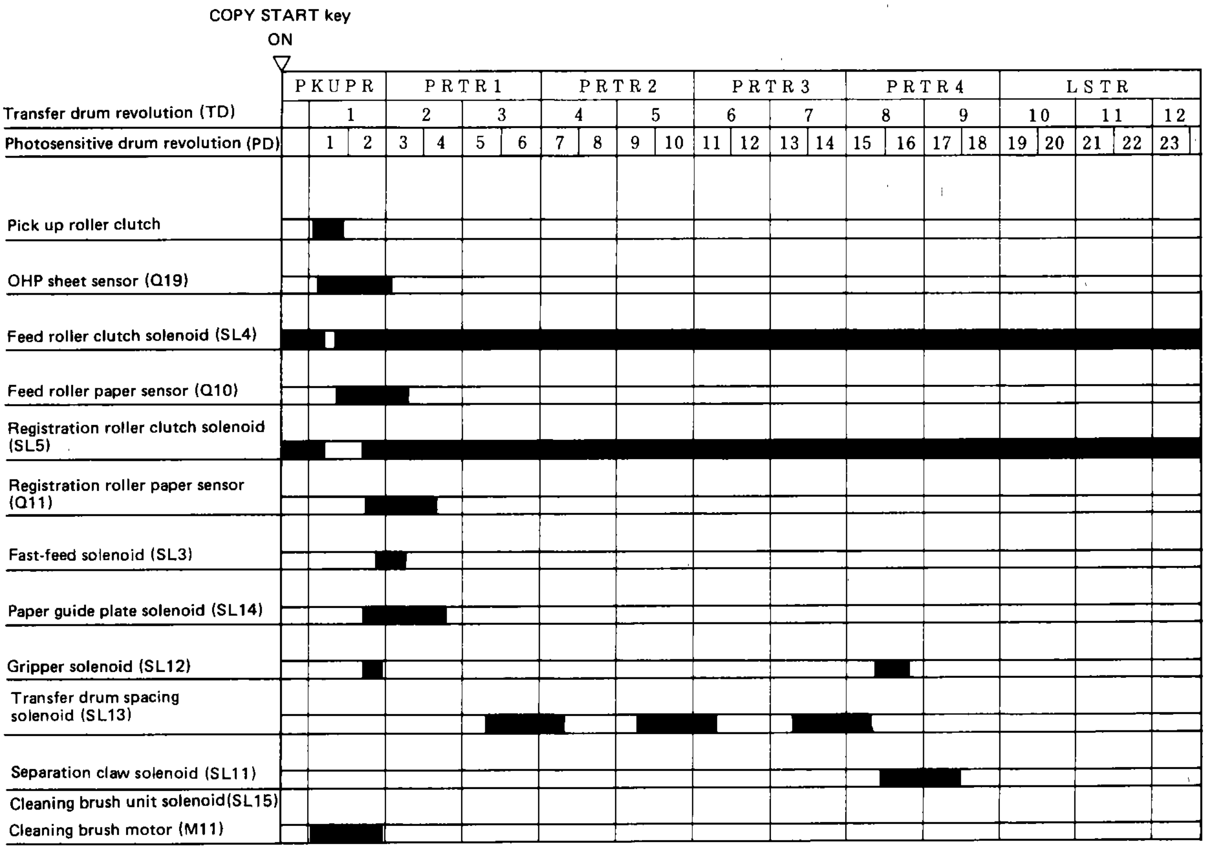

COPY START key
ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
Transfer drum revolution (TD)
1
2
3
4
5
6
7
8
9
10
11
12
Photosensitive drum revolution (PD)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Pick up roller clutch
OHP sheet sensor (Q19)
Feed roller clutch solenoid (SL4)
Feed roller paper sensor (Q10)
Registration roller clutch solenoid (SL5)
Registration roller paper sensor (Q11)
Fast-feed solenoid (SL3)
Paper guide plate solenoid (SL14)
Gripper solenoid (SL12)
Transfer drum spacing solenoid (SL13)
Separation claw solenoid (SL11)
Cleaning brush unit solenoid(SL15)
Cleaning brush motor (M11)

Figure 3-61 Other than A4/Letter/full color

F. Feeder Unit

The copy paper separated from the transfer drum is conveyed to the fixing unit by the feeder unit. When the leading edge of the paper arrives at the entrance to the fixing assembly, the feeder belt speed is reduced to one of two lower speeds to match the speed of the fixing unit rollers. Medium speed is used when fixing a paper copy, low speed for an image on OHP film.

	1	2	3
SL10	OFF	ON	OFF
SL9	OFF	ON	ON
Speed	High	Medium	Low

Table 3-7

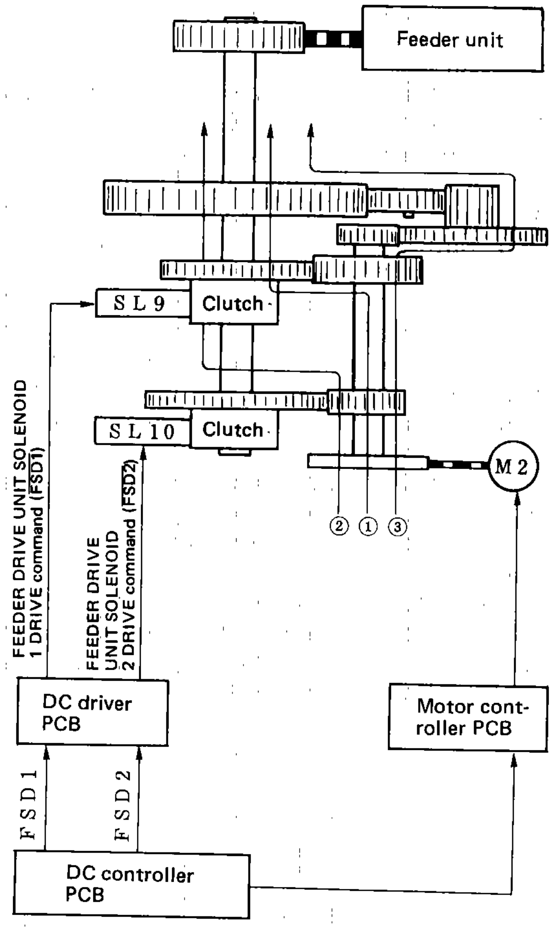

Feeder unit
SL9
Clutch
SL10
Clutch
M2
②
①
③
FEEDER DRIVE UNIT SOLENOID 1 DRIVE command (FSD1)
FEEDER DRIVE UNIT SOLENOID 2 DRIVE command (FSD2)
DC driver PCB
Motor controller PCB
FSD1
FSD2
DC controller PCB

Figure 3-62

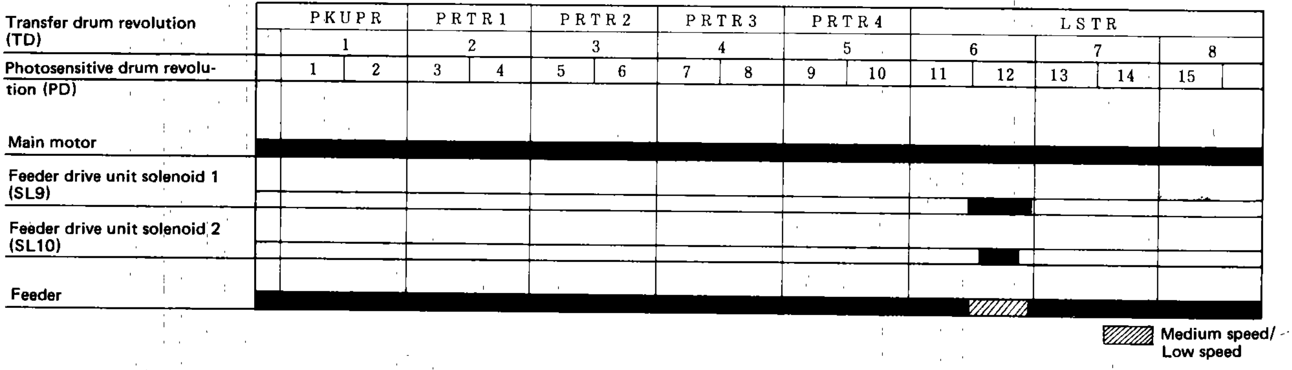

Transfer drum revolution (TD)
Photosensitive drum revolution (PD)
Main motor
Feeder drive unit solenoid 1 (SL9)
Feeder drive unit solenoid 2 (SL10)
Feeder
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
1
2
3
4
5
6
7
8
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
▨ Medium speed/Low speed

Figure 3-63 A4/Letter/full color

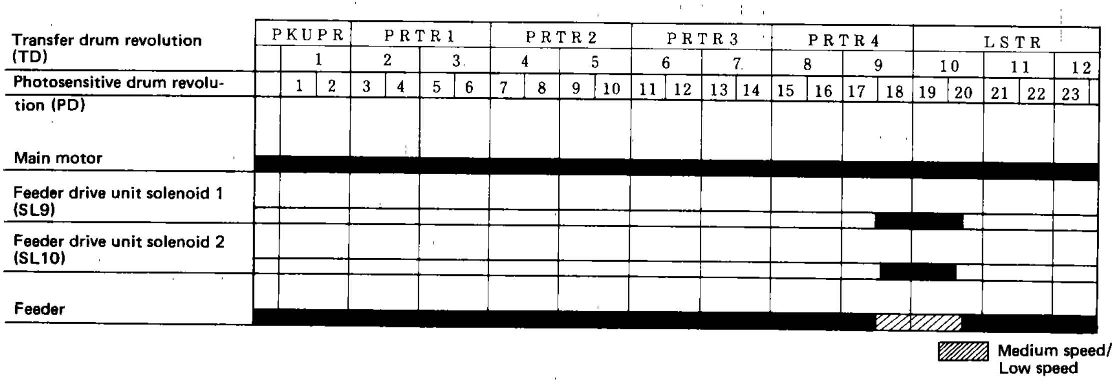

Transfer drum revolution (TD)
Photosensitive drum revolution (PD)
Main motor
Feeder drive unit solenoid 1 (SL9)
Feeder drive unit solenoid 2 (SL10)
Feeder
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
1
2
3
4
5
6
7
8
9
10
11
12
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
▨ Medium speed/Low speed

Figure 3-64 Other than A4/Letter/full color

G. Fixing and Delivery Units

1. General

The upper and lower rollers of the fixing unit are driven by main motor M2.

The fixing roller speed is switched to suit the type of copy paper. Normal speed is used for fixing copies on paper. The speed for fixing copies on OHP film is 45% of the normal speed. The fixing roller drive unit consists of two gearsets, each with its own solenoid-actuated clutch. When solenoid SL8 is OFF, the high-speed gearset drives the rollers, and when it is ON, the low-speed gearset operates. (A one-way clutch permits the gearsets to rotate independently.)

There is a heater in both the upper and lower fixing rollers. Fixing roller temperature is controlled by the DC controller using feedback from the sensor (thermistor TH1), which contacts the lower roller.

During copying, oil-applying roller solenoid SL6 is actuated and pulls the oil-applying roller into contact with the upper fixing roller. This applies a thin film of silicone oil to the roller to prevent offsetting. (Toner of one copy sticking to the roller and being transferred later to another copy).

The amount of oil remaining in the oil pan is sensed by the oil level sensing circuit. (explained below) When there is insufficient oil, this circuit outputs an OIL OUT ($\overline{\text{OEP}}$) signal to the DC controller which then lights the C display.

When the thickness of the roll of cleaning belt on the supply reel for the upper fixing roller decreases to a certain point (diameter), the cleaning belt sensor Q25 outputs a CLEANING BELT OUT signal (CBOUT) to the DC controller, which then lights the E display. (The upper roller is advanced by a solenoid-operated arm that is connected to the take-up reel by a one-way clutch. The arm turns the reel a small amount each time the solenoid operates.)

Reference

Target temperature	165°C
Heaters H1 and H2	400W

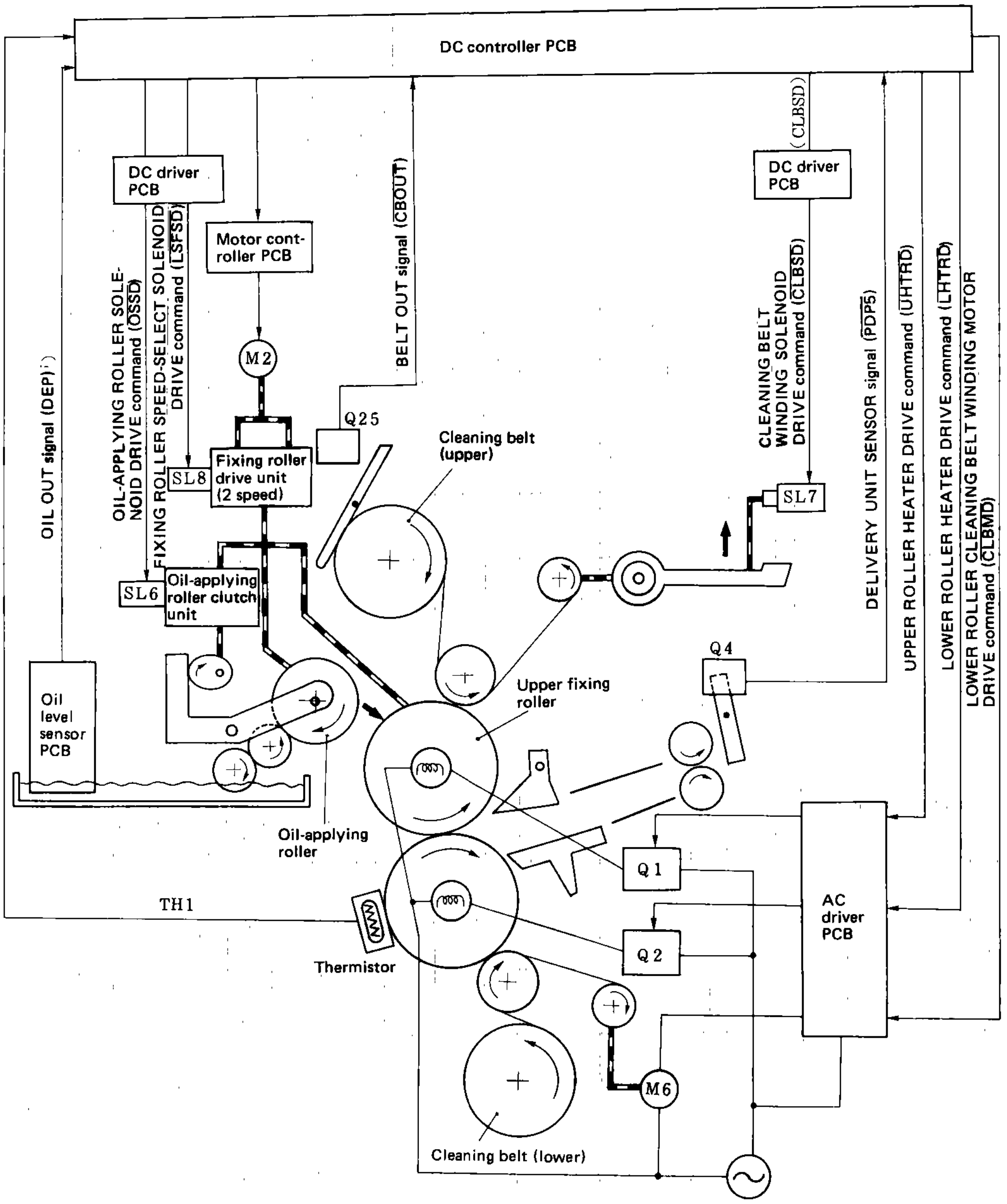

DC controller PCB
DC driver PCB
OIL OUT signal (DEP)
OIL-APPLYING ROLLER SOLENOID DRIVE command (OSSD)
FIXING ROLLER SPEED-SELECT SOLENOID DRIVE command (LSFSD)
Motor controller PCB
M2
BELT OUT signal (CBOUT)
Q25
Fixing roller drive unit (2 speed)
SL8
SL6
Oil-applying roller clutch unit
Cleaning belt (upper)
Oil level sensor PCB
Oil-applying roller
Upper fixing roller
TH1
Thermistor
(CLBSD)
DC driver PCB
CLEANING BELT WINDING SOLENOID DRIVE command (CLBSD)
SL7
DELIVERY UNIT SENSOR signal (PDP5)
UPPER ROLLER HEATER DRIVE command (UHTRD)
LOWER ROLLER HEATER DRIVE command (LHTRD)
LOWER ROLLER CLEANING BELT WINDING MOTOR DRIVE command (CLBMD)
Q4
Q1
Q2
AC driver PCB
M6
Cleaning belt (lower)

Figure 3-65

2. Oil Reservoir Level Sensing

The level of silicone oil in the oil pan is sensed by the LED-photo transistor unit shown in Figure 3-66 and the comparator circuit in Figure 3-68.

By a law of optics, a sheet of transparent material with one surface in contact with a liquid will reflect all light striking the other surface at any angle larger than a critical angle. If the oil pan is full, oil will contact the outer surfaces of the sensor, and the light from the LED will be reflected to the photo transistor PT. The PT will go ON (low resistance).

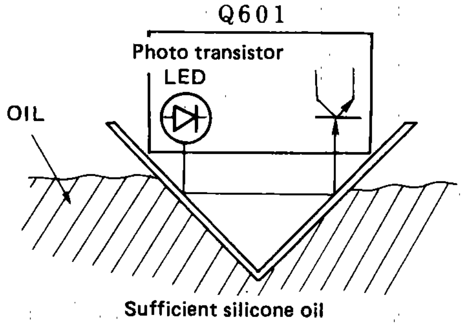

Q601
Photo transistor
LED
OIL
Sufficient silicone oil

Figure 3-66

The PT and LED are connected in the comparator circuit shown in Figure 3-68. When light strikes PT, it pulls Q602-3 low, so

Then, Q602-2 > Q602-3
↳Q602-1 is 1
↳LED601 OFF
↳$\overline{\text{OEP}} = 1$

If there is insufficient silicone oil in the oil pan, no oil will contact the outside of the sensor unit, and the light from the LED will pass through it.

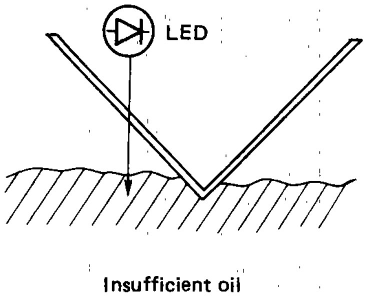

LED
Insufficient oil

Figure 3-67

Then, Q602-2 < Q602-3
↳Q602-1 is 0
↳LED601 ON
↳$\overline{\text{OEP}} = 0$

This informs the DC controller that there is not enough oil, so it lights the OIL OUT indicator on the control panel.

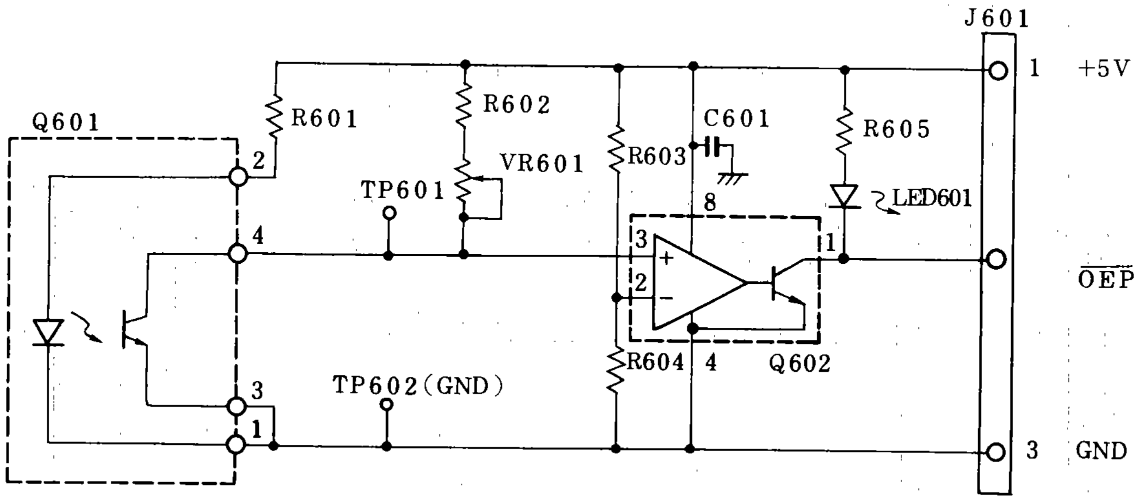

J601
1
+5V
Q601
R601
R602
VR601
TP601
R603
C601
8
R605
LED601
2
4
3
1
OEP
TP602(GND)
R604
4
Q602
3
GND

Figure 3-68

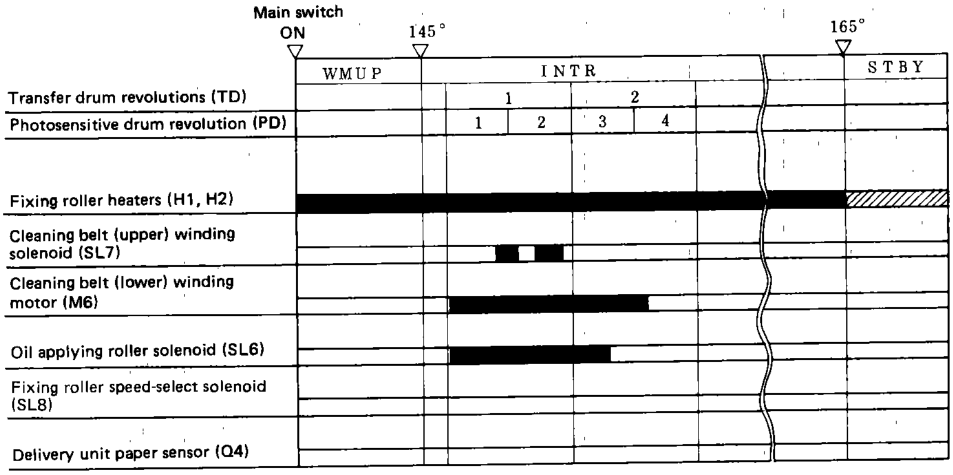

Main switch ON
145°
165°
WMUP
INTR
STBY
Transfer drum revolutions (TD)
1
2
Photosensitive drum revolution (PD)
1
2
3
4
Fixing roller heaters (H1, H2)
Cleaning belt (upper) winding solenoid (SL7)
Cleaning belt (lower) winding motor (M6)
Oil applying roller solenoid (SL6)
Fixing roller speed-select solenoid (SL8)
Delivery unit paper sensor (Q4)

Figure 3-69 Warm-up

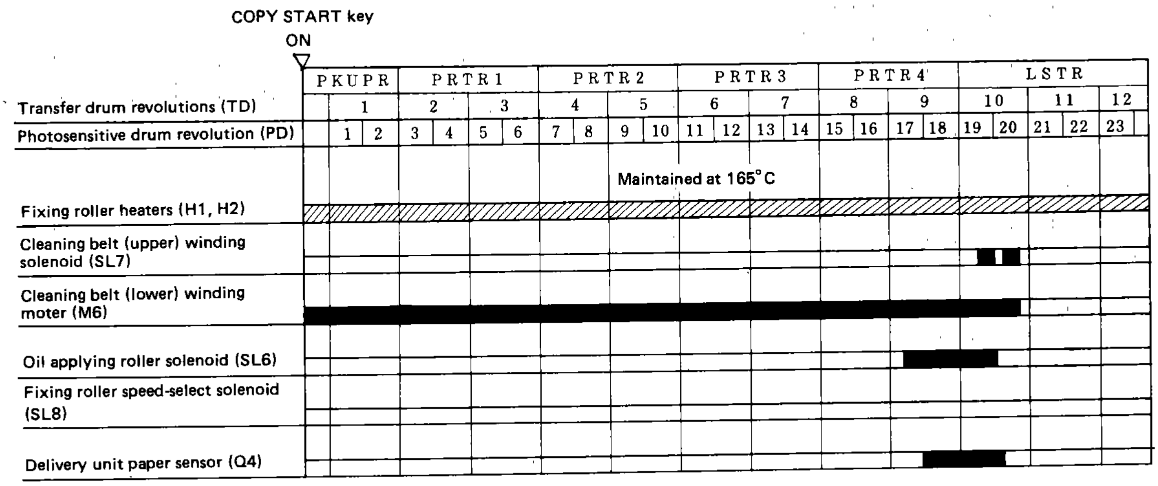

COPY START key ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
Transfer drum revolutions (TD)
1 2 3 4 5 6 7 8 9 10 11 12
Photosensitive drum revolution (PD)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Maintained at 165°C
Fixing roller heaters (H1, H2)
Cleaning belt (upper) winding solenoid (SL7)
Cleaning belt (lower) winding moter (M6)
Oil applying roller solenoid (SL6)
Fixing roller speed-select solenoid (SL8)
Delivery unit paper sensor (Q4)

Figure 3-70 A4/Letter/full color

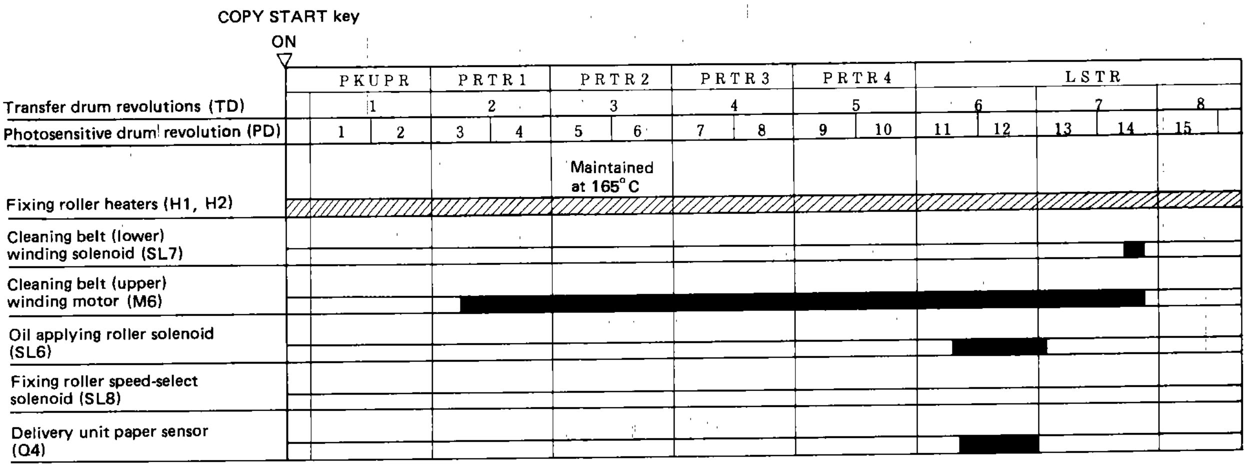

COPY START key ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
Transfer drum revolutions (TD)
1 2 3 4 5 6 7 8
Photosensitive drum revolution (PD)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Maintained at 165°C
Fixing roller heaters (H1, H2)
Cleaning belt (lower) winding solenoid (SL7)
Cleaning belt (upper) winding motor (M6)
Oil applying roller solenoid (SL6)
Fixing roller speed-select solenoid (SL8)
Delivery unit paper sensor (Q4)

Figure 3-71 Other than A4/Letter/full color

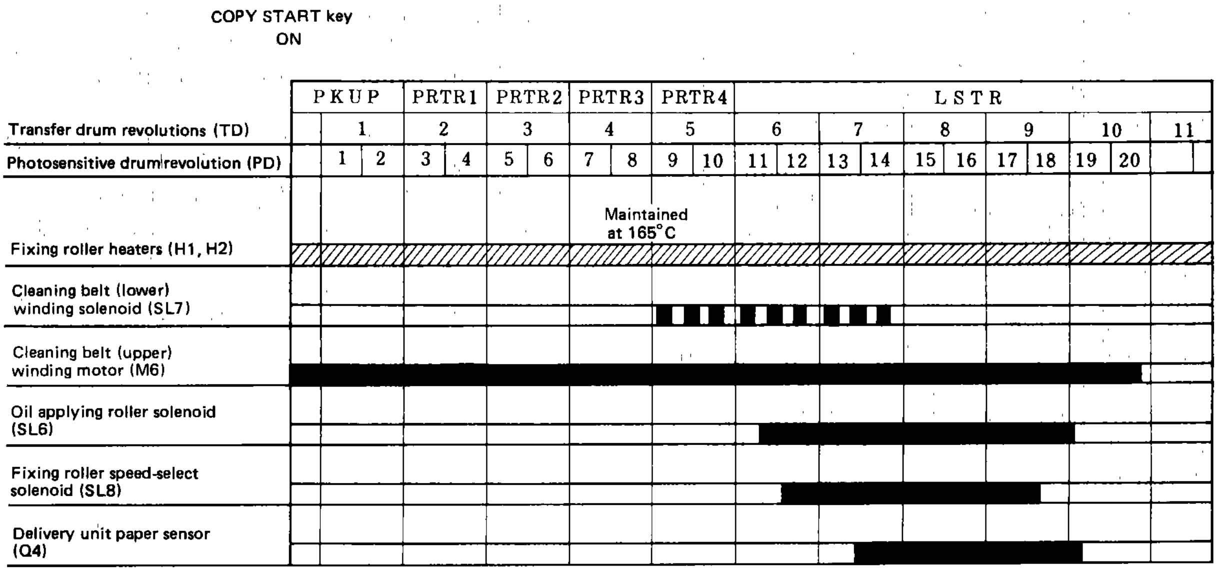


Figure 3-72 A4/Letter size OHP sheet/full color

H. Jam Detection System

Paper sensors are located through the printer to detect whether the copy paper is moving correctly. Presence of a sheet of paper at a sensor is identified by a signal to the microprocessor.

If the microprocessor identifies a jam, copying operation stops, the main and drum motors stop, and the fixing roller heaters go OFF.

The microprocessor identifies a paper jam in the following cases.

a. The copy paper does not reach the feed roller paper sensor (Q10) at the required time.
b. The copy paper does not reach the registration roller paper sensor (Q11) at the required time.
c. The copy paper is not wound around the transfer drum and sensed by the transfer drum paper sensor (Q18) at the required time.
d. The copy paper is not separated from the transfer drum and sensed by the separation unit paper sensor (Q17) at the required time.
e. The copy paper does not reach the delivery unit paper sensor (Q4) at the required time.
f. The copy paper does not pass delivery unit sensor (Q4) at the required time.

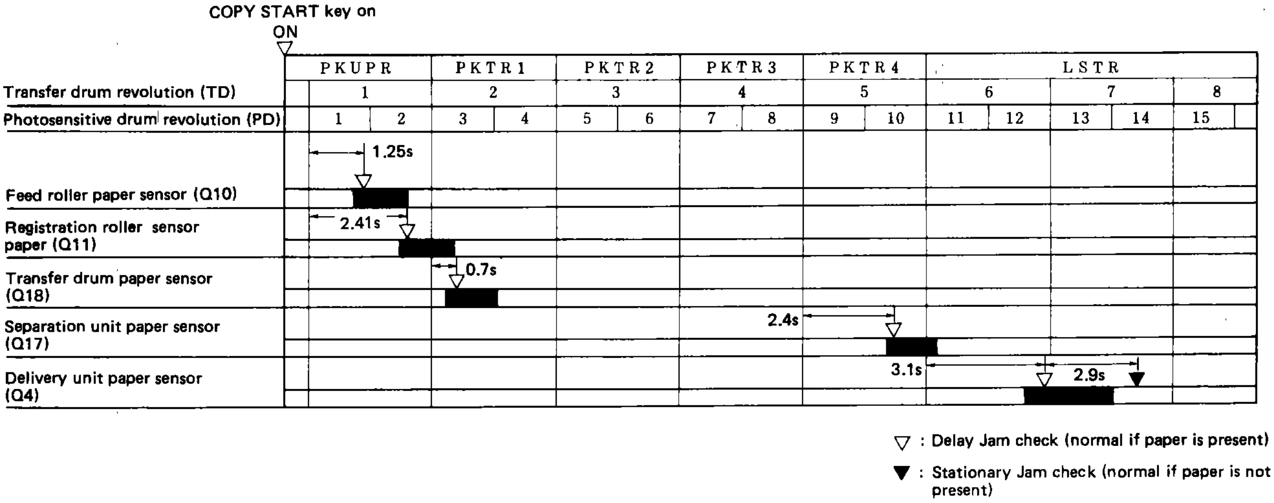

COPY START key on
ON
PKUPR
PKTR1
PKTR2
PKTR3
PKTR4
LSTR
Transfer drum revolution (TD)
1
2
3
4
5
6
7
8
Photosensitive drum revolution (PD)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
1.25s
Feed roller paper sensor (Q10)
2.41s
Registration roller sensor paper (Q11)
0.7s
Transfer drum paper sensor (Q18)
2.4s
Separation unit paper sensor (Q17)
3.1s
2.9s
Delivery unit paper sensor (Q4)
▽ : Delay Jam check (normal if paper is present)
▼ : Stationary Jam check (normal if paper is not present)

Figure 3-73 A4/Letter/full color

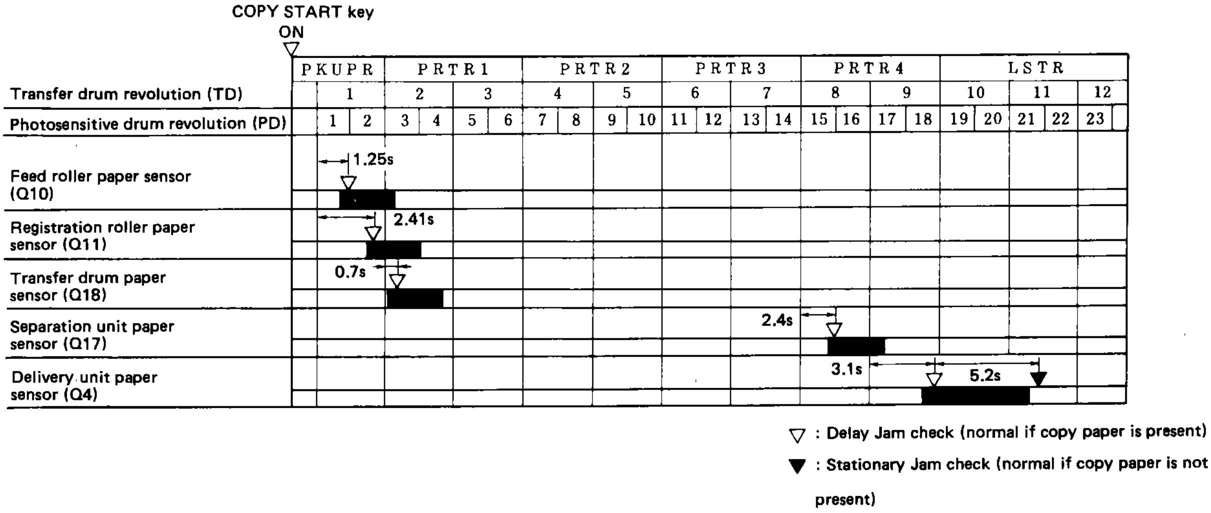

COPY START key
ON
PKUPR
PRTR1
PRTR2
PRTR3
PRTR4
LSTR
Transfer drum revolution (TD)
1 2 3 4 5 6 7 8 9 10 11 12
Photosensitive drum revolution (PD)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
1.25s
Feed roller paper sensor (Q10)
2.41s
Registration roller paper sensor (Q11)
0.7s
Transfer drum paper sensor (Q18)
2.4s
Separation unit paper sensor (Q17)
3.1s
5.2s
Delivery unit paper sensor (Q4)
▽ : Delay Jam check (normal if copy paper is present)
▼ : Stationary Jam check (normal if copy paper is not present)

Figure 3-74 Other than A4/Letter/full color

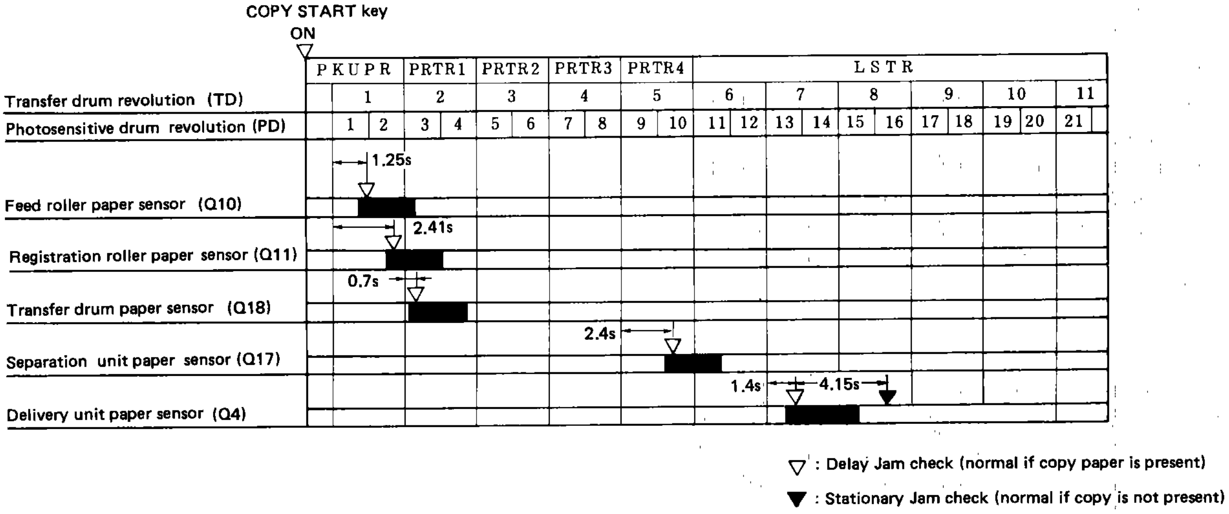


Figure 3-75 OHP sheet/full color

After the power has been turned on, if transfer drum paper sensor Q18 detects copy paper on the transfer drum during initial rotation (INTR), the copy paper is delivered out in the copy sequence shown in Figure 3-76.

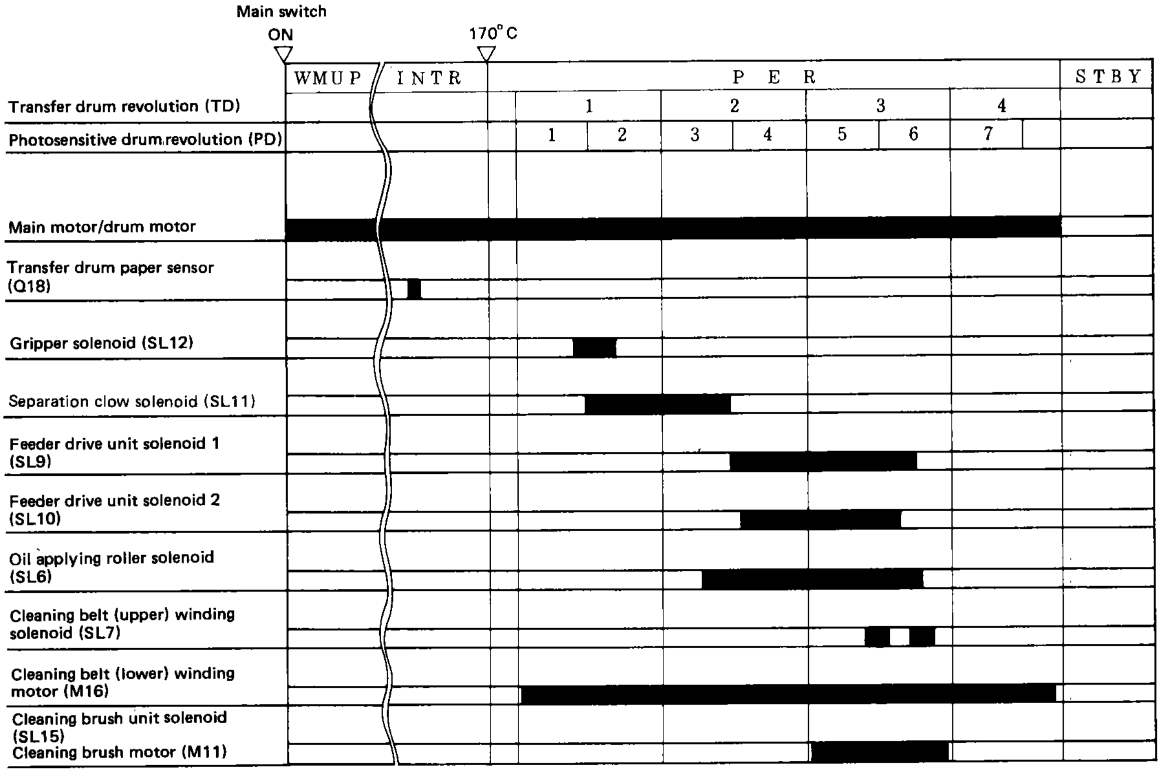


Figure 3-76

V. POWER SUPPLY

A. Layout

Figure 3-77 shows all the power supplies in the printer unit.

When the power switch is set ON, AC line voltage is applied to the DC power supply PCB, which supplies the following DC voltages: 24V, 12V, −12V, 5V, −5V to various parts of the machine.

B. Protective Measures

The DC power supply is protected by a fuse in the AC input line, and by an overcurrent protection circuit in each DC output which cuts off current in the event of excessive current flow due to a fault.

If such a protective circuit operates, set the main power switch OFF, eliminate the cause of the problem (leave the switch OFF for a minimum of 30 seconds), then switch the power back on. This procedure resets the protective circuit.

If the problem is not corrected and the system is repeatedly reset, the fuse in the AC line will blow.

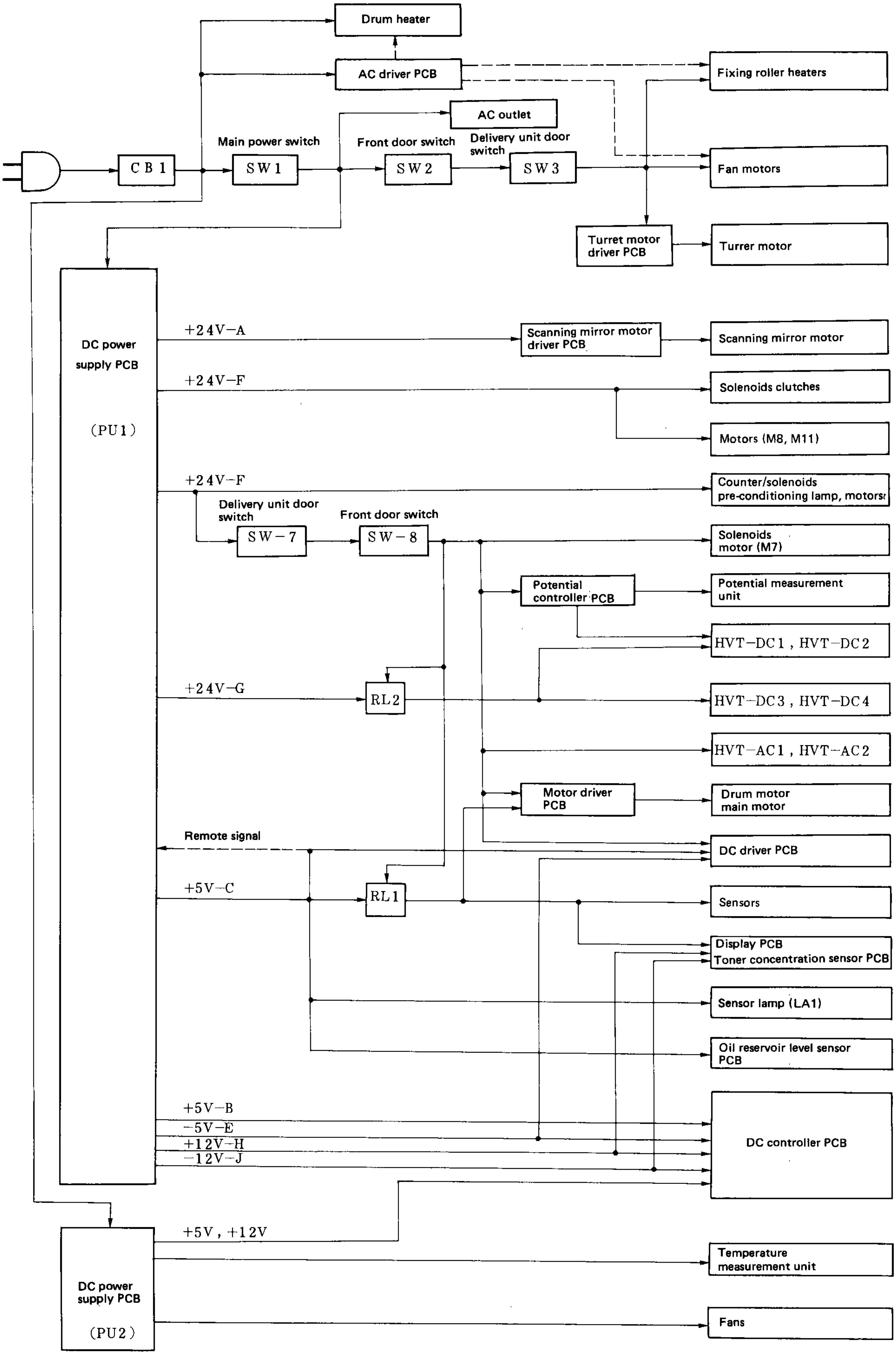
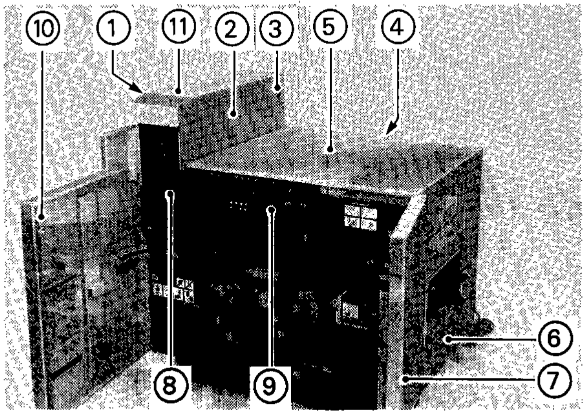

Drum heater
AC driver PCB
Fixing roller heaters
AC outlet
Main power switch
Front door switch
Delivery unit door switch
CB 1
SW 1
SW 2
SW 3
Fan motors
Turret motor driver PCB
Turrer motor
DC power supply PCB
(PU1)
+24V–A
Scanning mirror motor driver PCB
Scanning mirror motor
+24V–F
Solenoids clutches
Motors (M8, M11)
+24V–F
Counter/solenoids pre-conditioning lamp, motors
Delivery unit door switch
Front door switch
SW–7
SW–8
Solenoids motor (M7)
Potential controller PCB
Potential measurement unit
HVT–DC1, HVT–DC2
+24V–G
RL2
HVT–DC3, HVT–DC4
HVT–AC1, HVT–AC2
Motor driver PCB
Drum motor main motor
Remote signal
DC driver PCB
+5V–C
RL1
Sensors
Display PCB
Toner concentration sensor PCB
Sensor lamp (LA1)
Oil reservoir level sensor PCB
+5V–B
–5V–E
+12V–H
–12V–J
DC controller PCB
+5V, +12V
Temperature measurement unit
DC power supply PCB
(PU2)
Fans

Figure 3-77

I. EXTERNALS

A. Covers and Panels



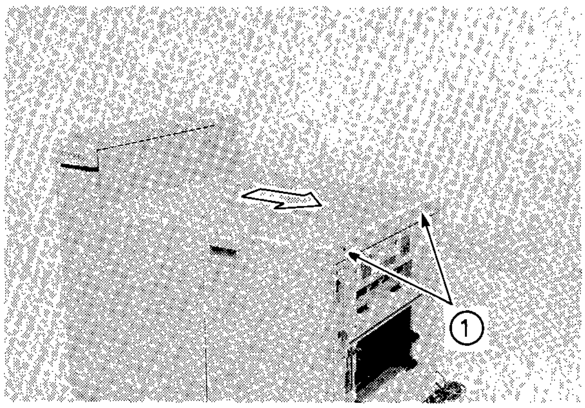
① Left panel (4)
② Hopper right panel (2)
③ Hopper rear panel (3)
④ Rear panel (4)
⑤ Top cover (6)
⑥ Right panel (4)
⑦ Front left door (4)
⑧ Hopper front cover (3)
⑨ Inner front cover (3)
⑩ Front left door (3)
⑪ Hopper top cover (3)

Figure 4-100

Note:
Numbers in parentheses refer to the number of mounting screws.

When cleaning, checking and repairing the device, follow the procedure described, and remove only the necessary parts. (Details of simple procedures are omitted.)

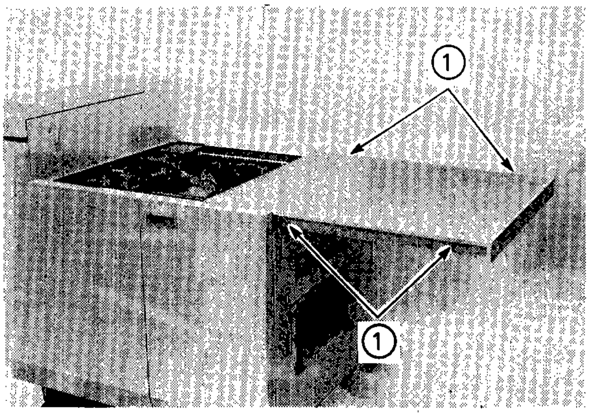
1. Top cover
   1) Remove the image scanner unit.
   2) Remove the two mounting screws and move the top cover to the right.



① Mounting screws

Figure 4-101

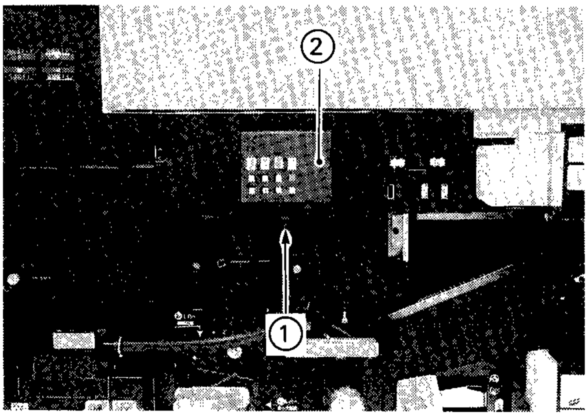
   3) Remove the four mounting screws then the top cover.



① Mounting screws

Figure 4-102

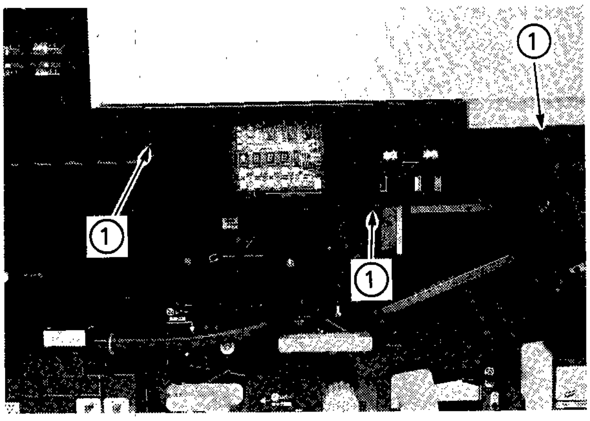
2. Inner front cover
   1) Remove the mounting screw then the display PCB cover.



① Mounting screw
② Display unit cover

Figure 4-103

2) Open the silicone oil bottle unit.
3) Remove the three mounting screws then the inner front cover.

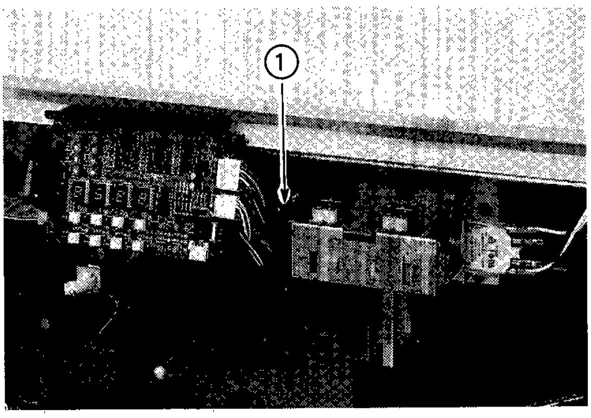


① Mounting screws

Figure 4-104

B. Door Switch Unit

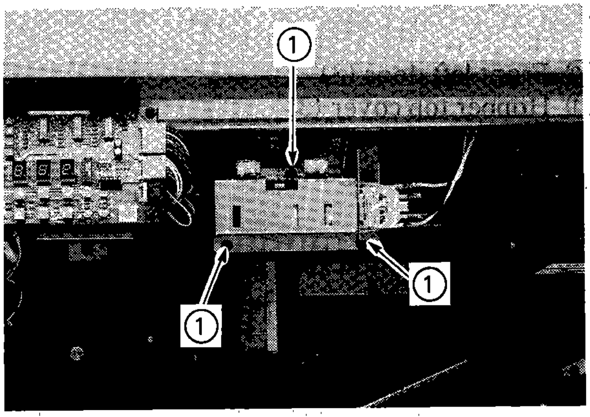
1. Removing the door switch unit
   1) Remove the inner front cover.
   2) Remove the shutter cable.



① Cable

Figure 4-105

   3) Remove the three mounting screws then the door switch unit.



① Mounting screws

Figure 4-106

C. Fans

1. General

The following six fans circulate air within the device to prevent overheating.

Primary corona fan (M5):	Supplies air to the primary corona area.
Feeder fan (M7):	Holds copy paper onto the feeder belts.
Exhaust fan (M8):	Removes hot air from the device.
Toner dust collector motor 1 (M9):	Collects toner around the photosensitive drum.
Toner dust collector motor 2 (M10):	Collects toner from the transfer drum unit.
Inner exhaust fan (M14):	Removes ozone from the copier.

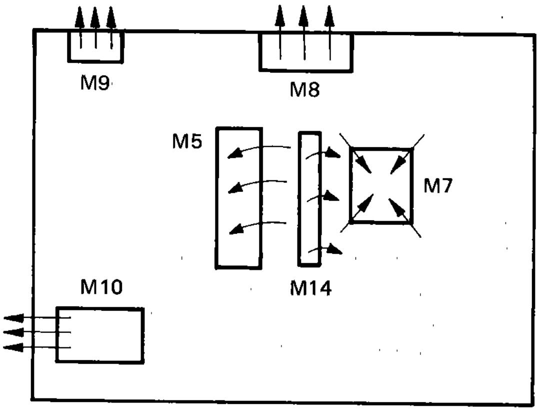
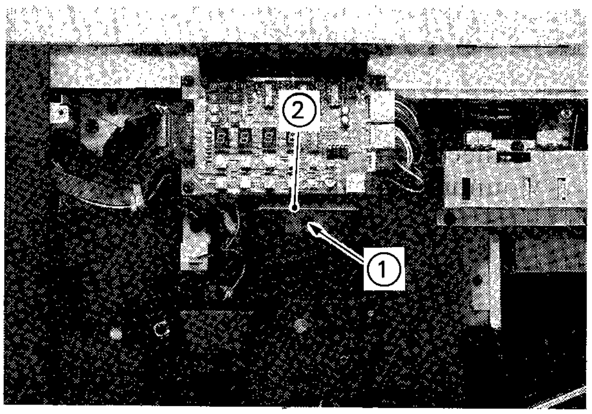


Figure 4-107

2. Primary corona fan (M5)

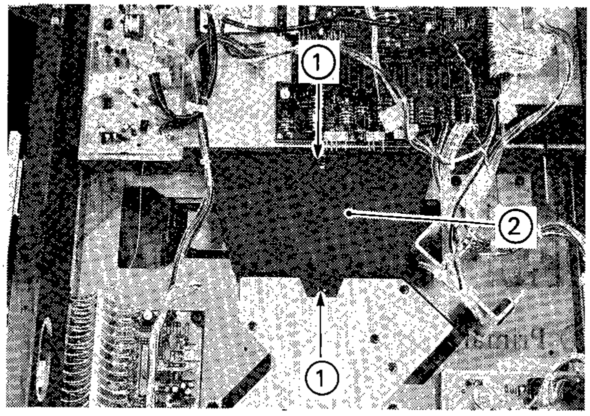
a. Removing the filter
1) Remove the inner front cover.
2) Remove the mounting screw and pull the filter toward you.



① Mounting screw
② Filter

Figure 4-108

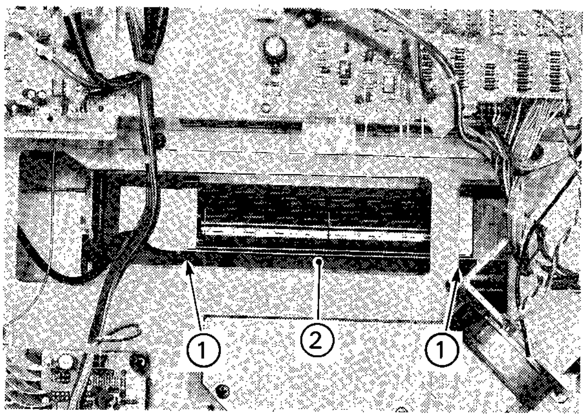
b. Removing the primary corona fan.
1) Remove the filter
2) Move the top cover to the right.
3) Pull out connectors J204 and J205 from the DC driver PCB.
4) Remove the two mounting screws, and remove the optical path unit.



① Screws
② Optical path unit

Figure 4-109

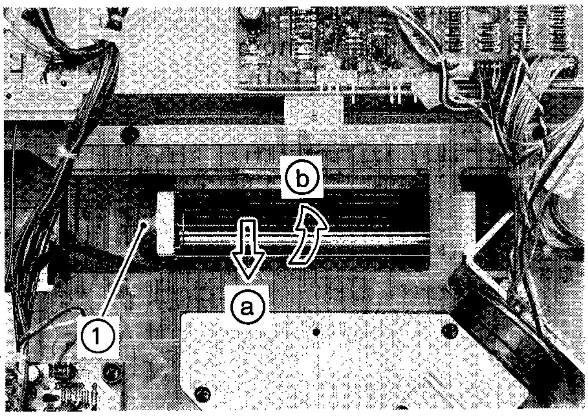
5) Remove the two mounting screws then the fan guide plate.



① Screws (M3 × 6)
② Fan guide plate

Figure 4-110

6) Move the primary corona fan as shown. Rotate the fan 90° counterclockwise and remove it.

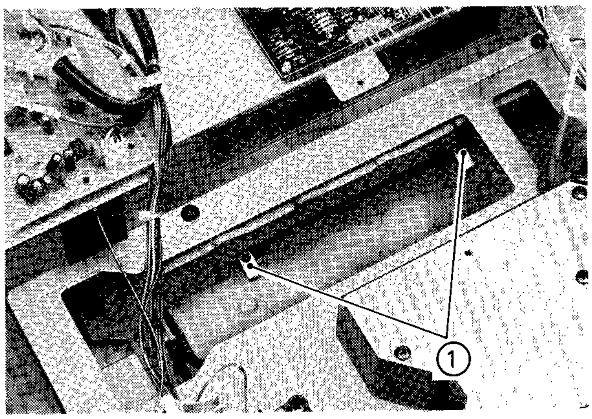


① Primary corona fan

Figure 4-111

7) Pull out the connector of the primary corona fan.

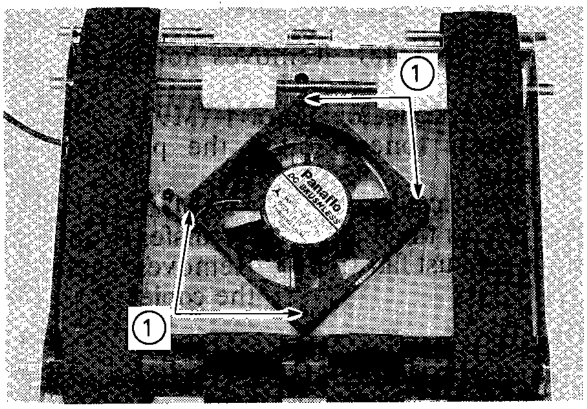
Note:
Mount the primary corona fan so that the bottom plate of the fan is under the leaf springs shown in the figure below.



① Leaf springs

Figure 4-112

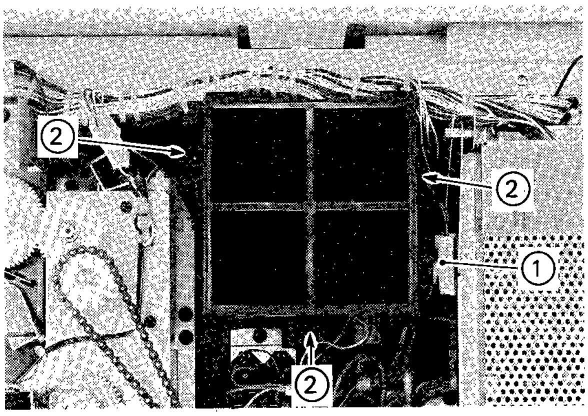
3. Feeder fan (M7)
a. Removing the feeder fan
1) Remove the feeder from the copy.
2) Remove the four belts from the feeder.
3) Remove the four mounting screws then the feeder fan.



① Screws

Figure 4-113

4. Exhaust fan (M8)
a. Removing the exhaust fan
1) Disconnect the connector.
2) Remove the three mounting screws then the exhaust fan unit.

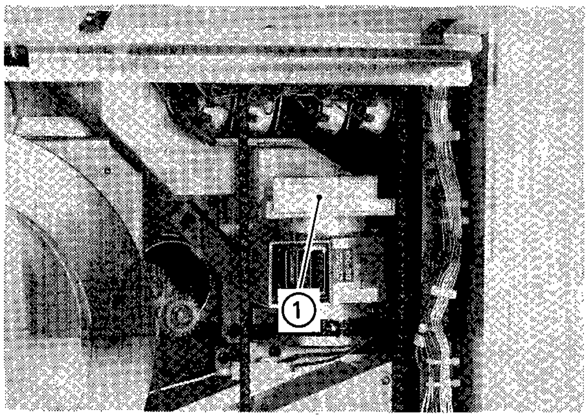


① Connector
② Mounting screws

Figure 4-114

5. Toner dust collecting motor 1 (M9)

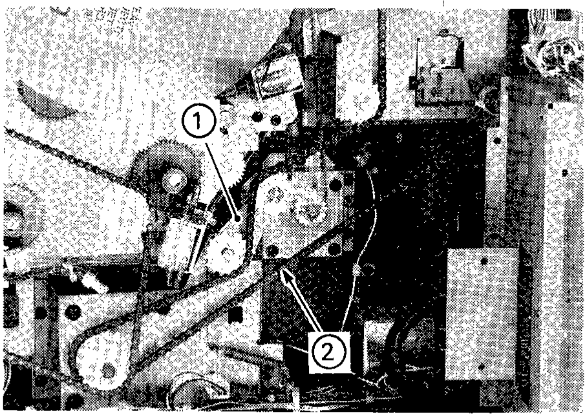
a. Removing the filter
1) Raise the DC controller PCB.
2) Pull out the filter.



① Filter

Figure 4-115

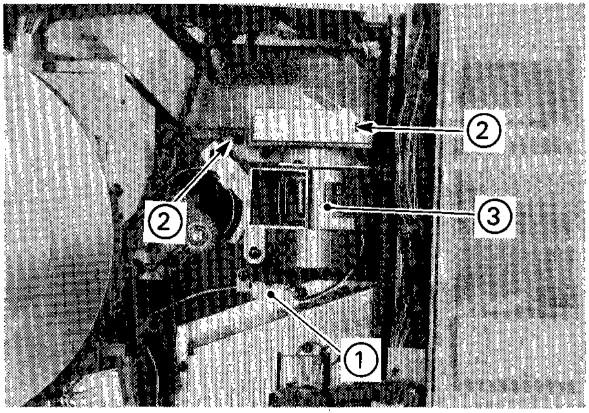
b. Removing toner dust collecting motor 1
1) Raise the DC controller PC board.
2) Open the power supply unit.
3) Move the tension sprocket spindle plate of the chain, and remove the chain.



① Tension sprocket spindle plate
② Chain

Figure 4-116

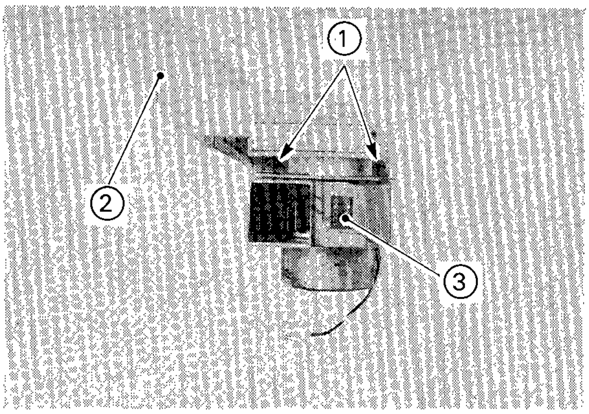
4) Disconnect the connector.
5) Remove the three mounting screws then toner dust collecting motor 1.



① Connector
② Mounting screws
③ Toner dust collecting motor 1

Figure 4-117

6) Remove the two mounting screws then the duct.
7) Remove the three mounting screws then the motor.



① Mounting screws
② Duct
③ Motor

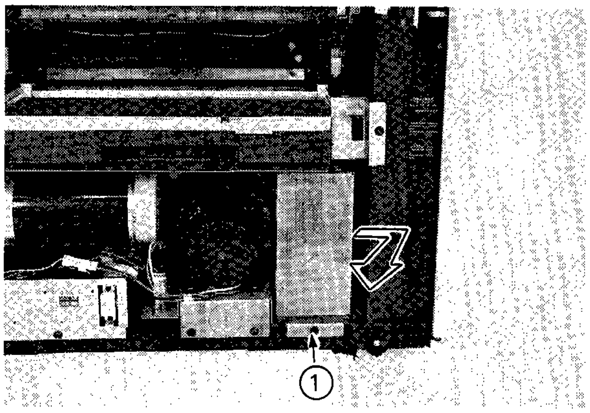
Figure 4-118

6. Toner dust collecting motor 2 (M10)

a. Removing the filter

1) Remove the mounting screw.

2) Move the filter to the right, then pull it out.

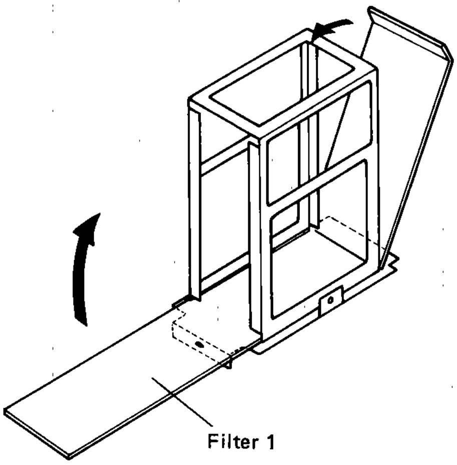


① Mounting screw

Figure 4-119

b. Mounting the filter

1)



2)

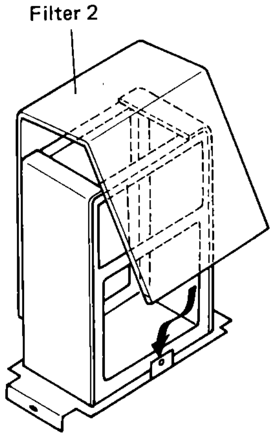


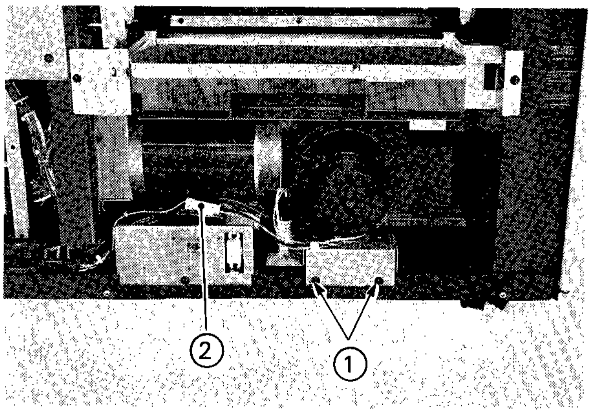
Figure 4-120

c. Removing toner dust collecting motor 2

1) Remove the filter.

2) Disconnect the connector.

3) Remove the two mounting screws then the motor.



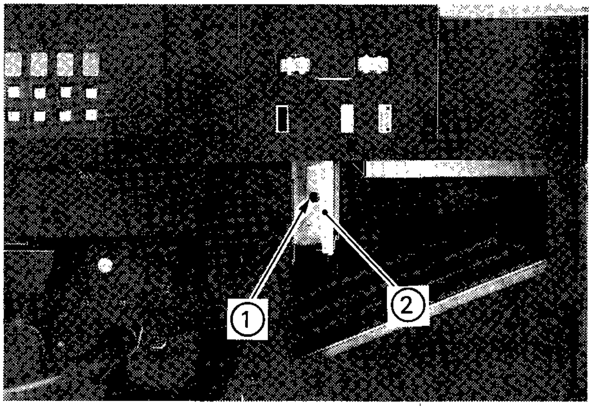
① Mounting screws
② Connector

Figure 4-121

7. Inner exhaust fan

a. Removing the filter

1) Remove the mounting screw, and pull the filter out.

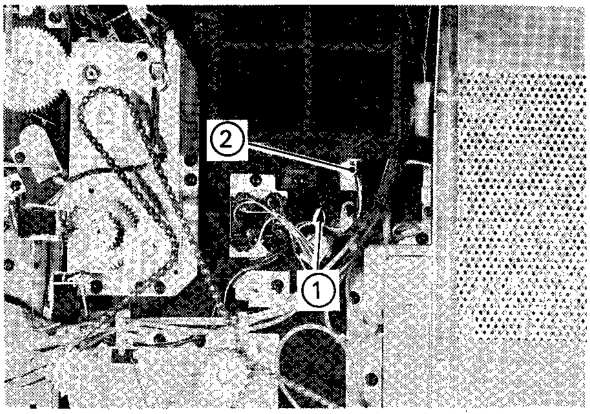


① Mounting screw
② Filter

Figure 4-122

b. Removing the inner exhaust fan

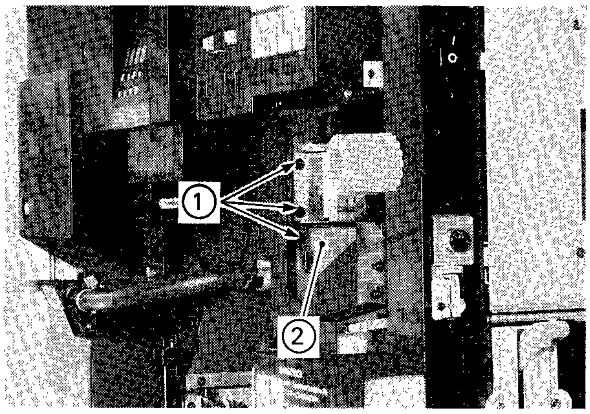
1) Remove the transfer drum unit.
2) Remove the filter.
3) Remove the mounting screw and the connector.



① Mounting screw
② Connector

Figure 4-123

4) Remove the mounting screw then the fan support plate.
5) Remove the two mounting screws then the fan.



① Mounting screws
② Fan support plate

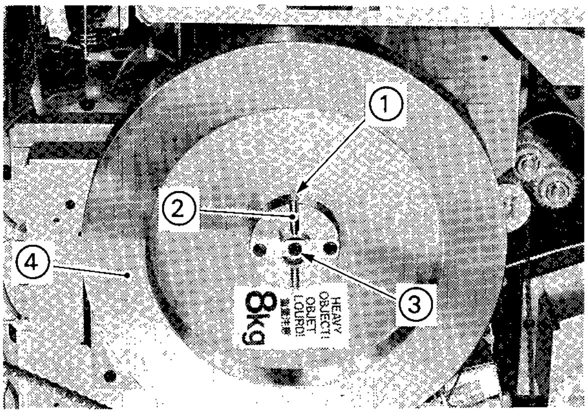
Figure 4-124

II. DRIVE SYSTEM

A. Drum Motor Unit

1. Removing the drum motor.
   1) Raise the DC controller PCB.
   2) Open the PCBs unit.
   3) Remove one E ring and pull out the pin.
   4) Remove the mounting screw then the flywheel.

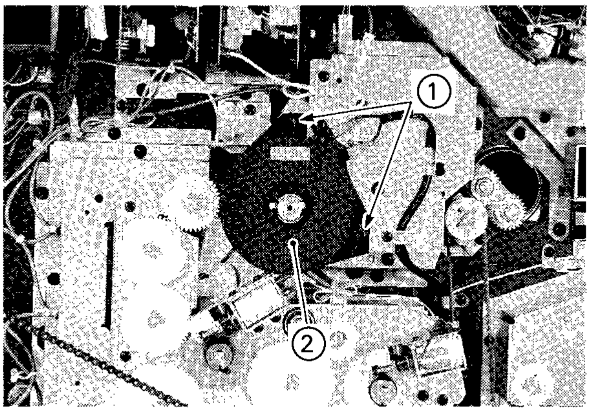
Note:
Do not drop the flywheel since it is heavy (about 8 kg).



① E ring
② Pin
③ Mounting screw
④ Flywheel

Figure 4-200

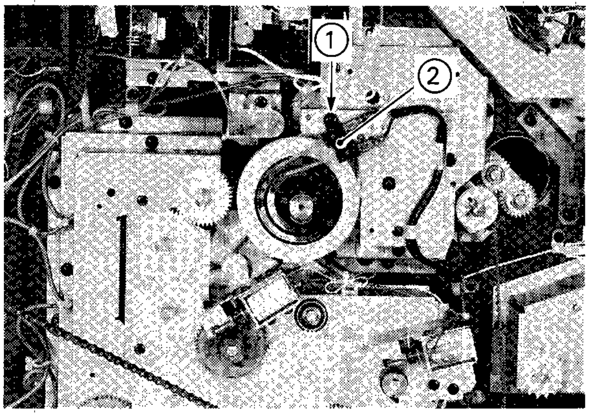
5) Remove the two mounting screws then the gear cover.



① Mounting screws
② Gear cover

Figure 4-201

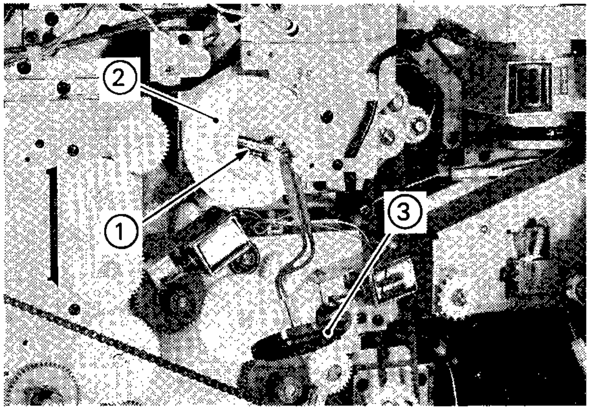
6) Remove the mounting screw then the brush unit.



① Mounting screw
② Brush unit

Figure 4-202

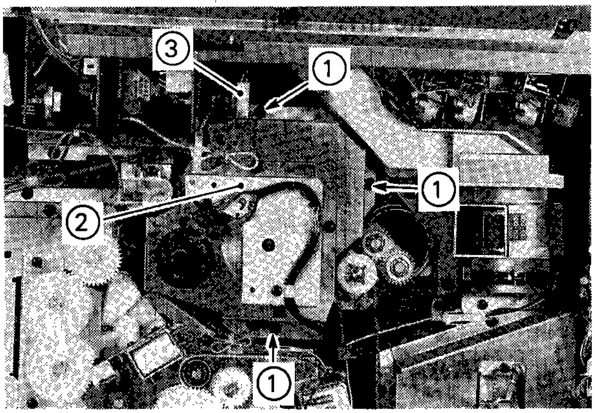
7) Remove the drum heater and drum drive gear.



① Drum heater
② Drum drive gear
③ Brush-unit connector

Figure 4-203

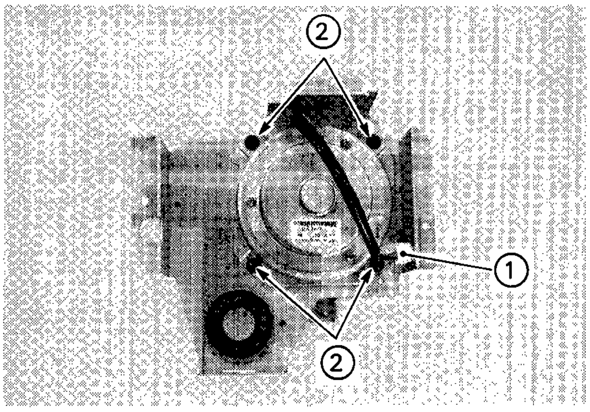
8) Disconnect the connector.
9) Remove the three mounting screws then the drum motor unit.



① Mounting screws
② Drum motor unit
③ Connector

Figure 4-204

9) Remove the connector from the motor mounting plate.
10) Remove the four mounting screws then the drum motor.



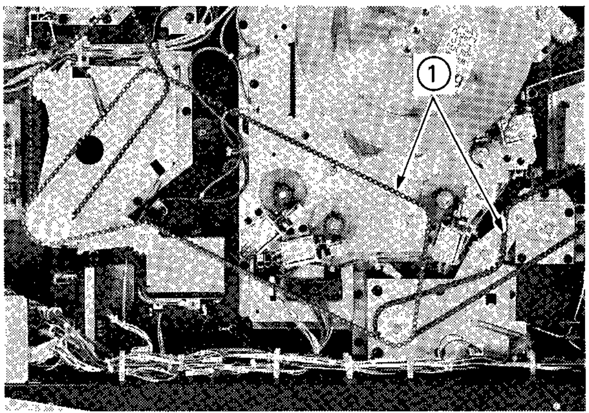
① Connector
② Mounting screws

Figure 4-205

- The procedure to reassemble the drum motor unit is the opposite of the procedure used to dismantle it. However, note the following points:
  - · To mount the drum heater, assemble the drum heater, drum drive gear, and load-dispatching coupling, then insert them on the drum shaft. Be sure not to damage the heater cord.

B. Main Motor Unit

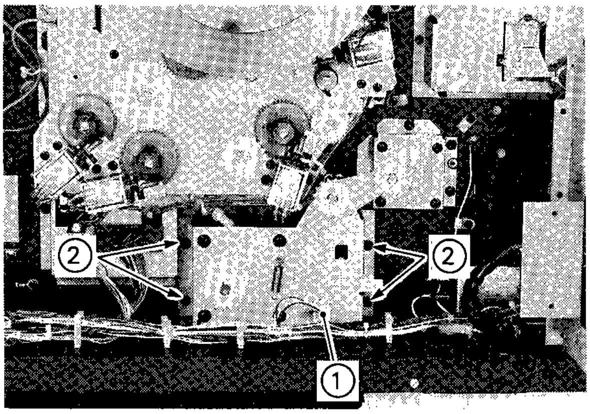
1. Removing the main motor unit
   1) Raise the DC controller PCB.
   2) Open the PCBs unit.
   3) Move the arm, and remove the two chains.



① Chains

Figure 4-206

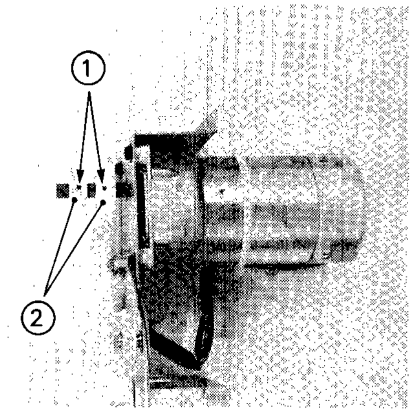
4) Disconnect the connector.
5) Remove the four mounting screws then the main motor unit.



① Connector
② Mounting screws

Figure 4-207

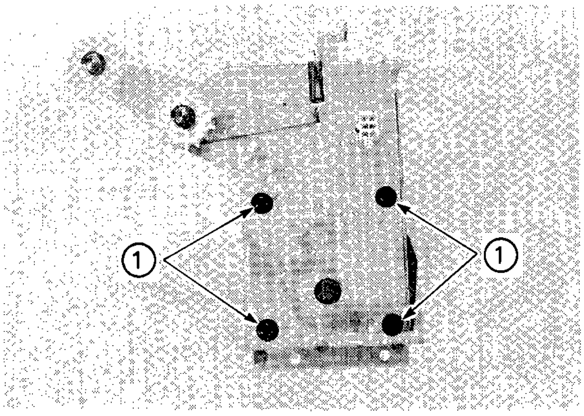
6) Remove the two setscrews, then the two sprockets.



① Setscrews
② Sprockets

Figure 4-208

7) Remove the four mounting screws then the main motor.



① Mounting screws

Figure 4-209

2. Sprocket mounting position

Mount the sprockets as shown in the figure below.

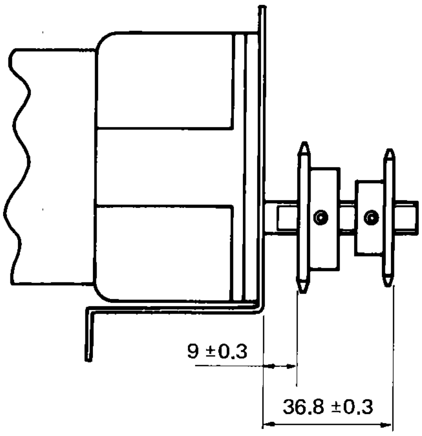
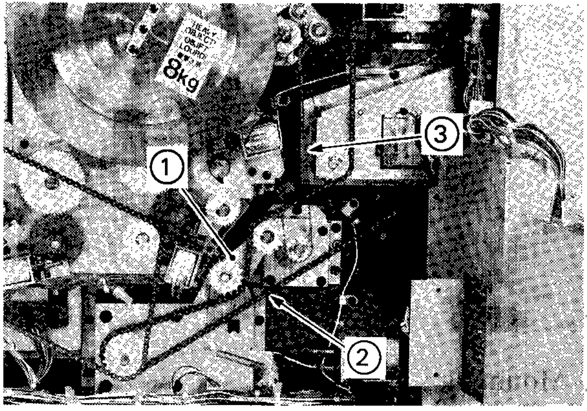


Figure 4-210

C. Developing Unit Drive Motor Unit

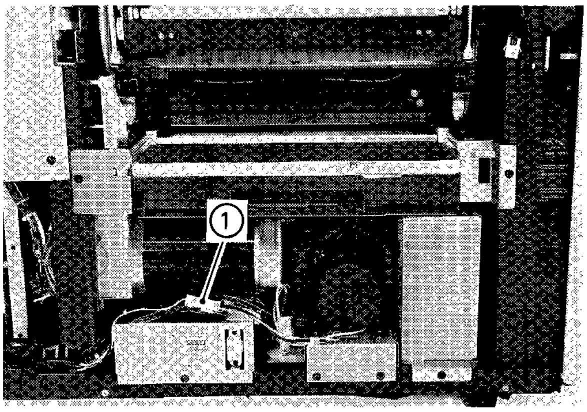
1. Removing the developing unit drive motor unit
   1) Move the arm, and remove the chain.
   2) Remove the drive belt.



① Arm
② Chain
③ Drive belt

Figure 4-211

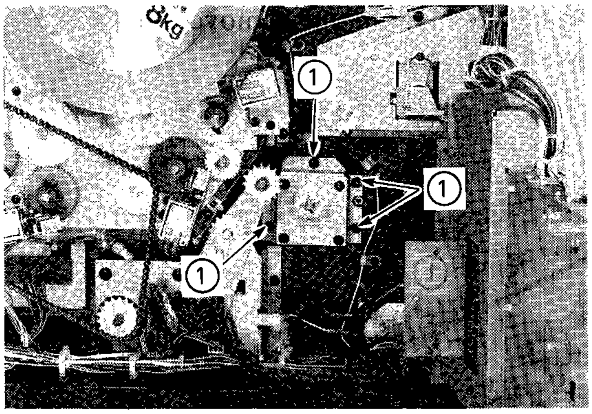
3) Disconnect the connector (2P) under the roller.



① Connector

Figure 4-212

4) Remove the four mounting screws then the developing unit drive motor unit.

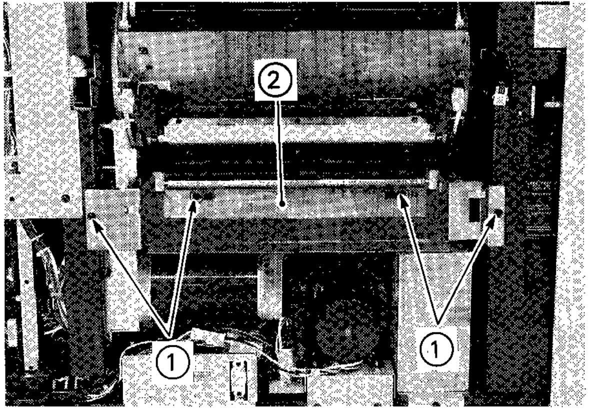


① Mounting screws

Figure 4-213

D. Turret Motor Unit

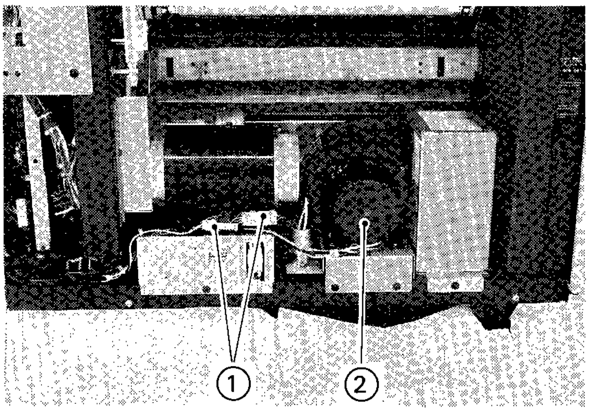
1. Removing the turret motor
   1) Remove the developer collector.
   2) Remove the four mounting screws then the developer collector unit.



① Mounting screws
② Developer collector unit

Figure 4-214

   3) Disconnect the two connectors (3P and 6P).
   4) Remove the toner dust collecting motor 2.



① Connectors
② Toner dust collecting motor 2

Figure 4-215

2. Cam mounting position

Adjust the position of the control ring so that the distance between the cam and the lock lever is 4 ± 1 mm when the control ring is rotated clockwise until it stops.

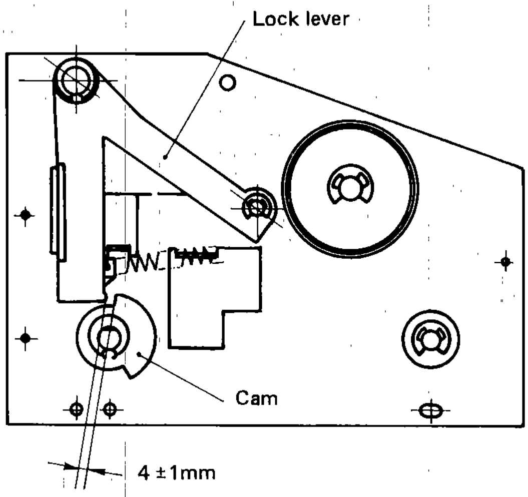


Figure 4-221

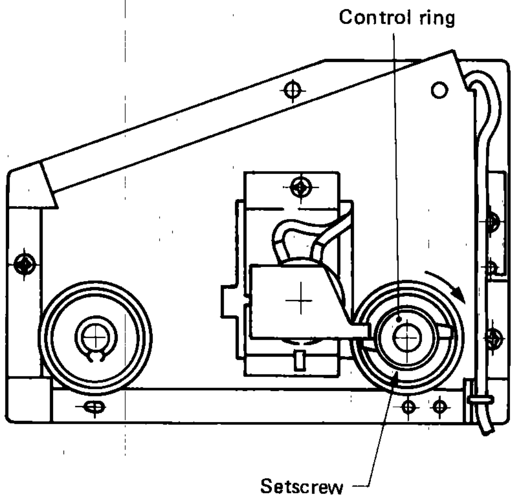
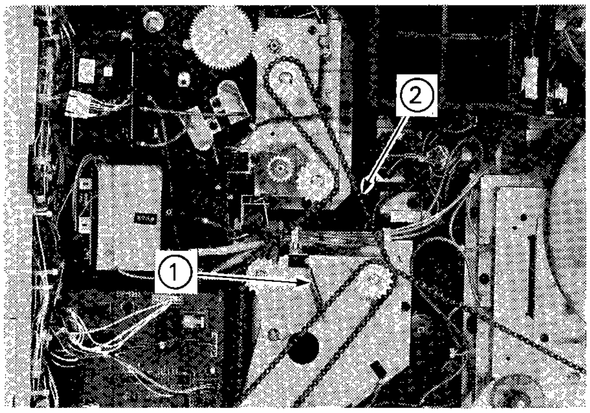


Figure 4-222

F. Fixing/Feeder Drive Unit

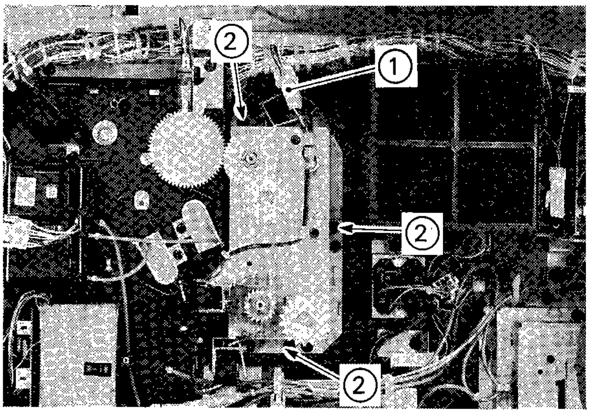
1. Removing the fixing/feeder drive unit
   1) Remove the spring then the chain.



① Spring ② Chain

Figure 4-223

2) Disconnect the connector (4P).
3) Remove the three mounting screws then the fixing/feeder drive unit.



① Connector ② Mounting screws

Figure 4-224

2. Wiring to solenoid

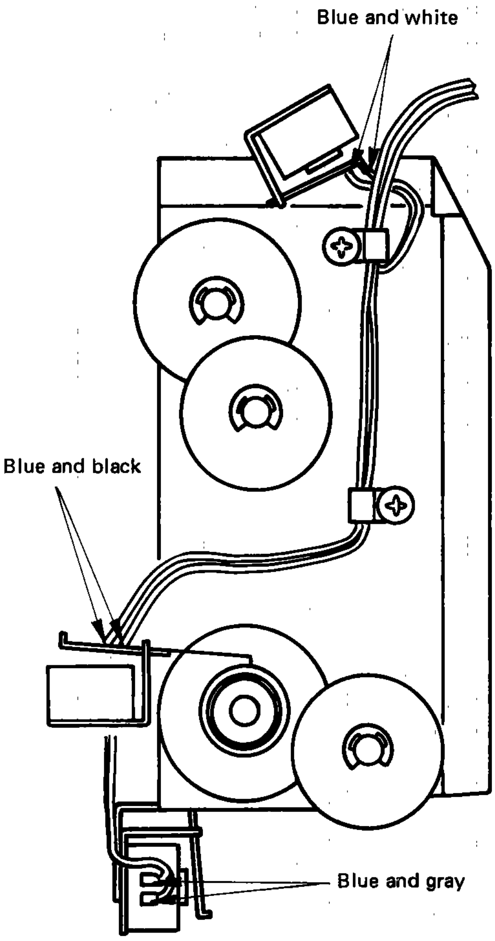

Blue and white
Blue and black
Blue and gray

Figure 4-225

3. 42T gear (FS2-0816) orientation
A one-way clutch is built in the 42T gear. Note that the gear cannot be driven if it is oriented backward.

Fixing drive unit: Place the A section of 42T gear facing the rear panel.
Feeder drive unit: Place part A of the 42T gear facing inside the device.

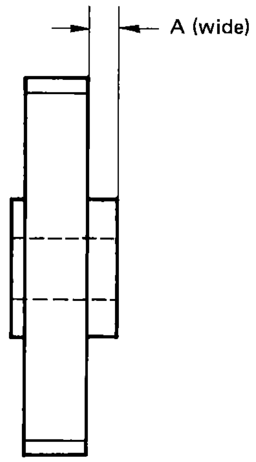


Figure 4-226 42T gear

4. Oiling
Oil the spring clutch unit with low viscosity lubricating oil.

G. Transfer Drum Assembly Drive Unit

1. Construction

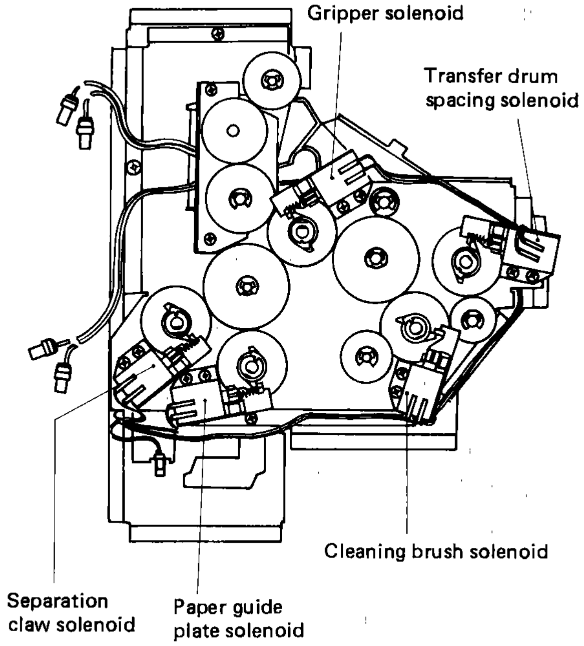

Gripper solenoid
Transfer drum spacing solenoid
Cleaning brush solenoid
Separation claw solenoid
Paper guide plate solenoid

Figure 4-227

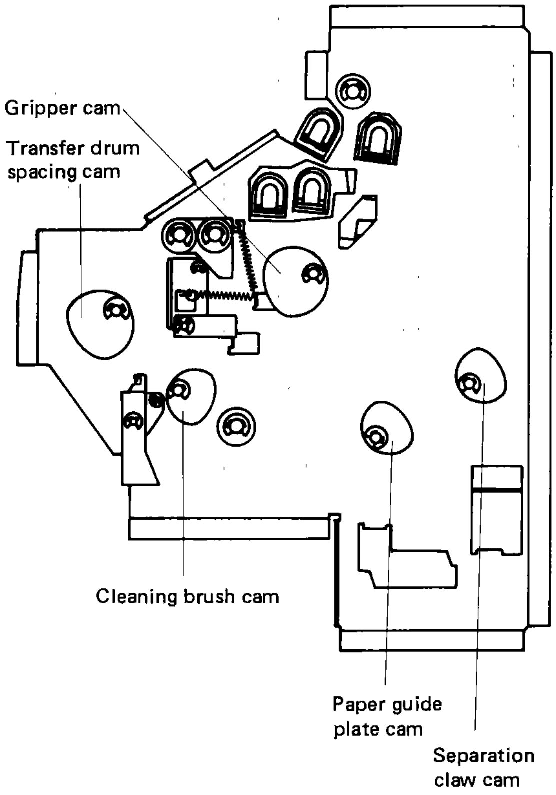

Gripper cam
Transfer drum spacing cam
Cleaning brush cam
Paper guide plate cam
Separation claw cam

Figure 4-228 Home positions of cams

2. Solenoid mounting positions

Mount solenoids so that the plunger stroke is 3 ± 0.2 mm.

Note:
This is for all solenoids.

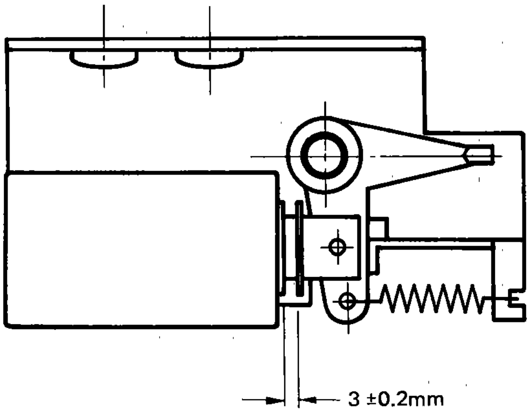
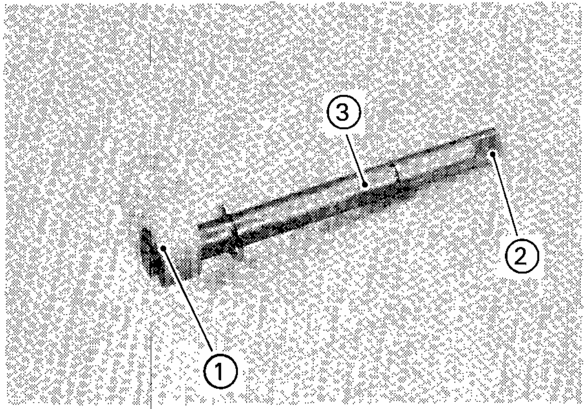


Figure 4-229

3. Cam mounting positions

Mount the cam so that the projection of the cam is at A of the drive shaft.



① Projection
② A
③ Drive shaft

Figure 4-230

Mount the cam at the position shown in Figure 4-228 with the solenoid off.

4. Oiling

Oil the spring clutch unit with low viscosity lubricating oil

III. PAPER TRANSPORT SYSTEM

A. Pick-up Control Unit

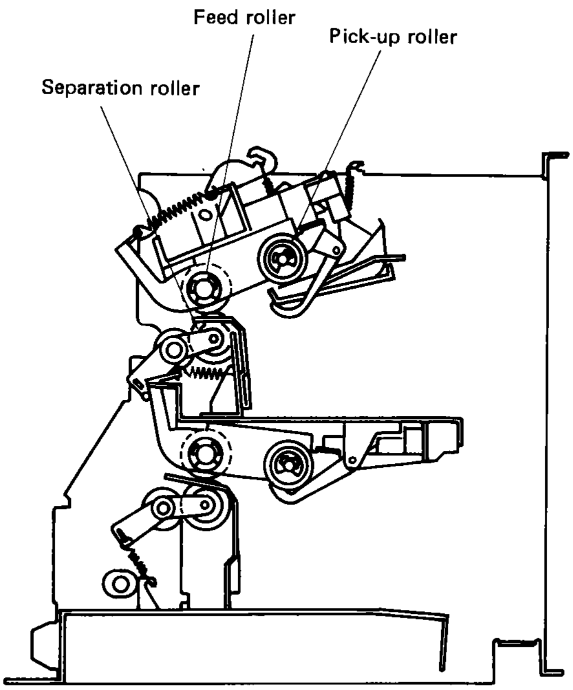

Feed roller
Pick-up roller
Separation roller

Figure 4-300 Cross-sectional view

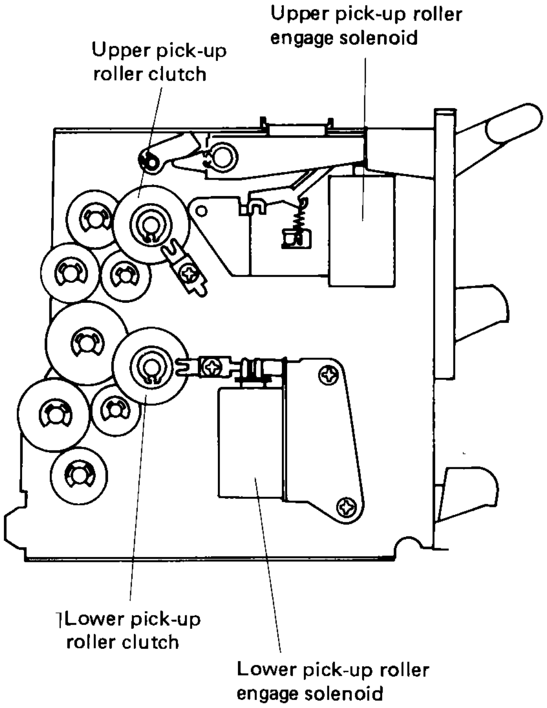
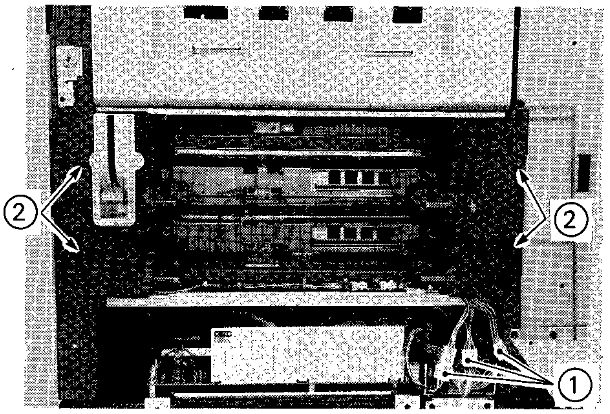

Upper pick-up roller engage solenoid
Upper pick-up roller clutch
Lower pick-up roller clutch
Lower pick-up roller engage solenoid

Figure 4-301 Front view

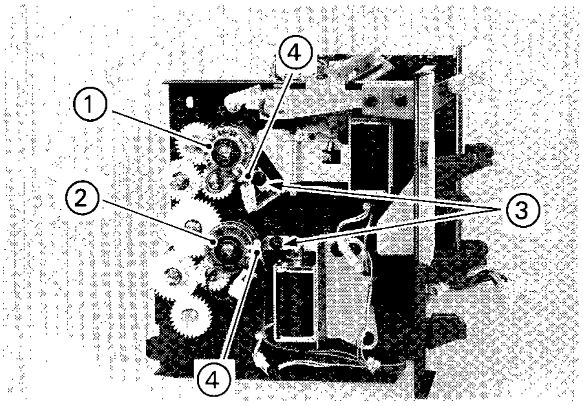
2. Removing the cassette holder
   1) Disconnect the three connectors.
   2) Remove the four mounting screws, and remove the cassette holder.



① Connectors
② Mounting screws

Figure 4-302

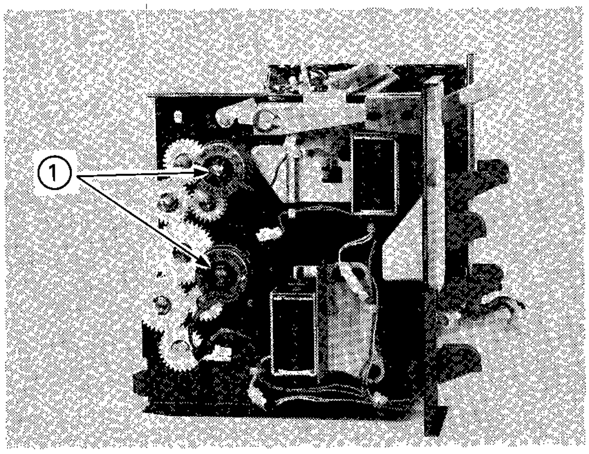
3. Removing the pick-up roller clutch
   1) Remove the cassette holder from the copier.
   2) Disconnect the connector.
   3) Remove the mounting screw then the clutch lock plate.



① Upper pick-up roller clutch
② Lower pick-up roller clutch
③ Mounting screws
④ Clutch lock plates

Figure 4-303

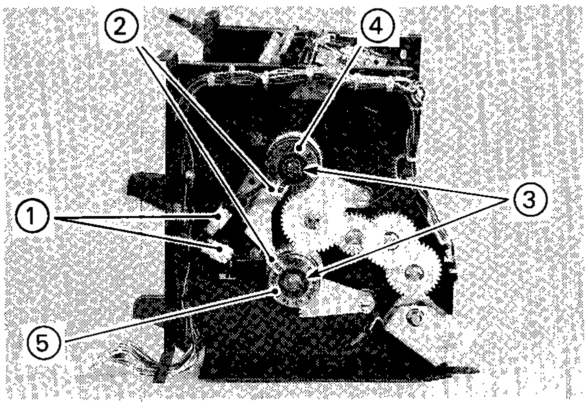
4) Remove the grip ring then the pick-up roller clutch.



① Grip rings

Figure 4-304

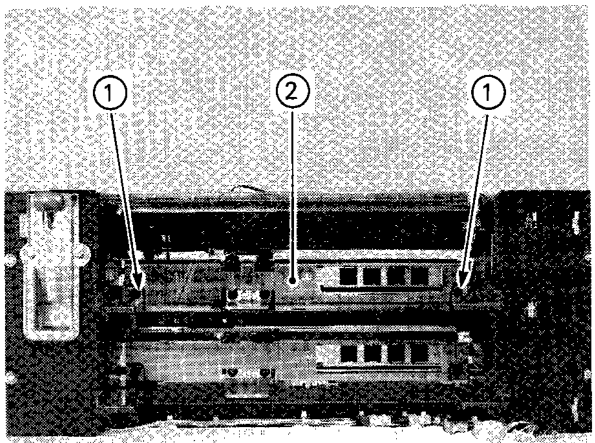
4. Removing the upper or lower lifter clutch
1) Remove the cassette holder from the copier.
2) Disconnect the connector.
3) Remove the mounting screw then the clutch lock plate.
4) Remove the grip retaining ring then the lifter clutch.



① Connectors
② Clutch lock plates
③ Grip rings
④ Upper lifter clutch
⑤ Lower lifter clutch

Figure 4-305

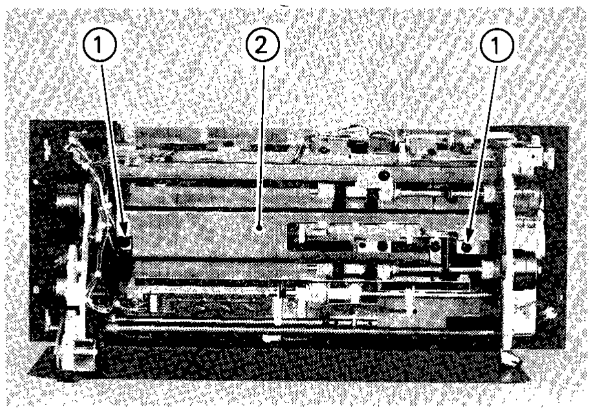
5. Removing the upper separation/feed/pick-up roller
1) Remove the cassette holder from the copier.
2) Remove the two mounting screws then the upper pick-up paper guide plate.



① Mounting screws
② Upper pick-up paper guide plate

Figure 4-306

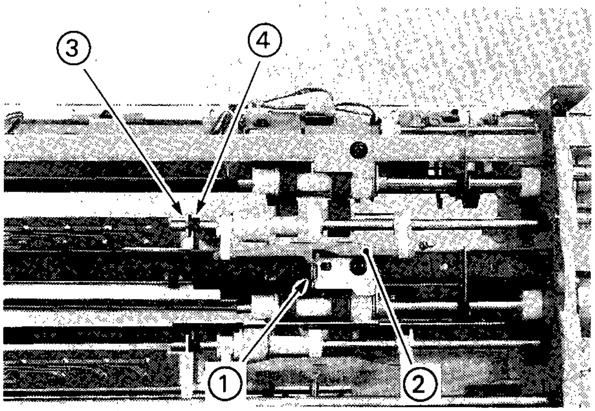
3) Remove the three mounting screws then the pick-up paper guide plate.



① Mounting screws
② Pick-up paper guide plate

Figure 4-307

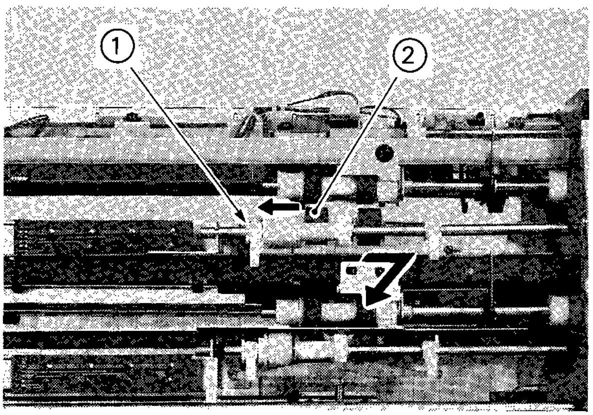
4) Remove the spring then the spring hook plate.
5) Remove the retaining ring with fingers or pliers, and remove the bushing.



① Spring ③ Retaining ring
② Spring hook plate ④ Bushing

Figure 4-308

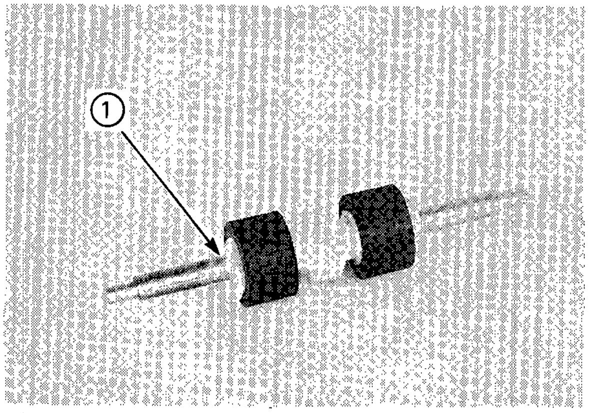
6) Press the separation roller shaft toward the front side plate then pull it toward you.
7) Remove the retaining ring then the separation roller unit.



① Retaining ring
② Separation roller unit

Figure 4-309

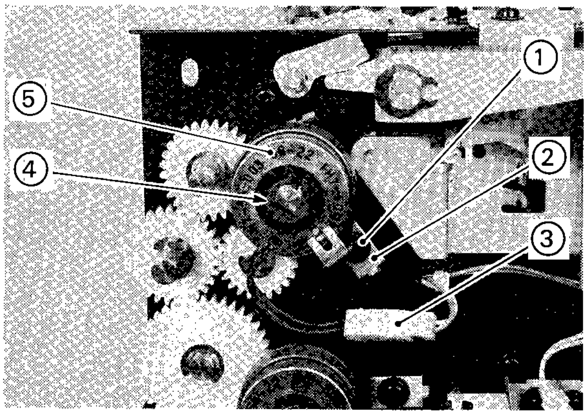
8) Remove the retaining ring then the separation roller.



① Retaining ring

Figure 4-310

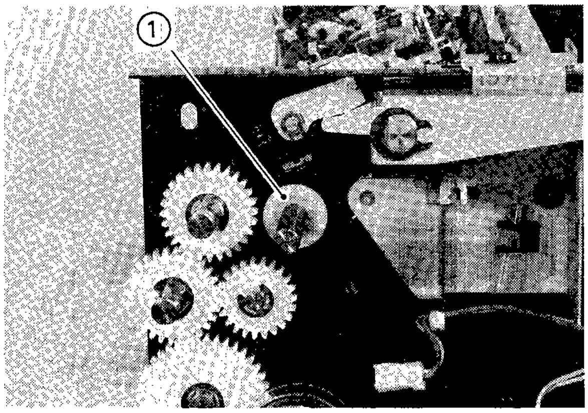
9) Remove the mounting screw then the clutch lock plate.
10) Remove the connector, the grip ring, then the upper pick-up roller clutch.



① Mounting screw
② Clutch lock plate
③ Connector
④ Grip ring
⑤ Upper pick-up roller clutch

Figure 4-311

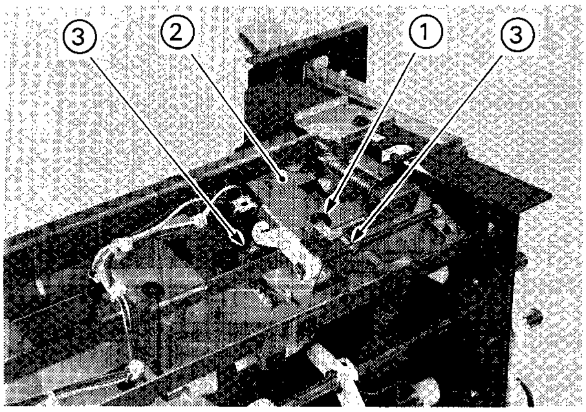
11) Remove the ball bearing.



① Ball bearing

Figure 4-312

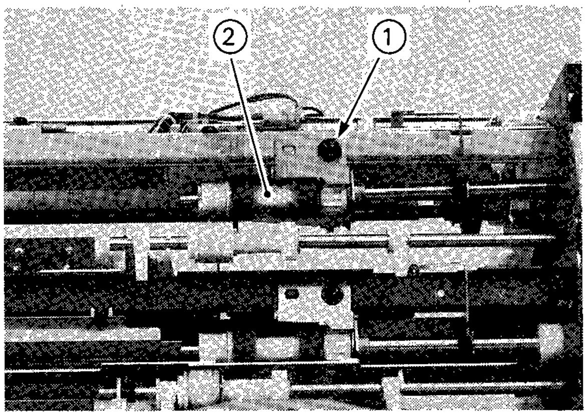
12) Remove the mounting screw then the upper cassette paper sensor.
13) Remove the two springs.



① Mounting screw
② Upper cassette paper sensor
③ Springs

Figure 4-313

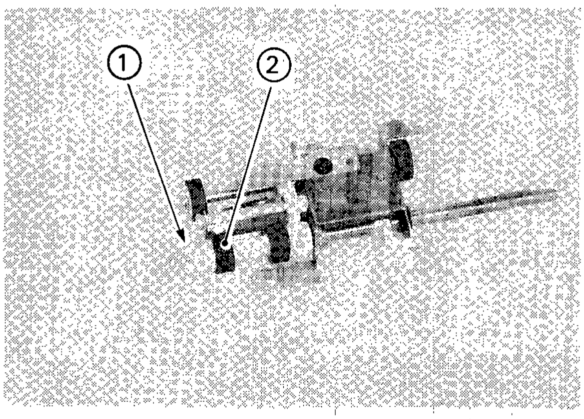
14) Remove the mounting screw then the pick-up roller unit.



① Mounting screw
② Pick-up roller unit

Figure 4-314

15) Remove the retaining ring then the feed roller.

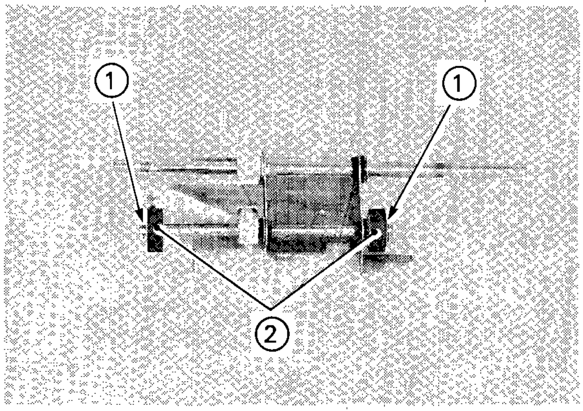


① Retaining roller ② Feed roller

Figure 4-315

16) Remove the two E rings then the two pick-up rollers.

Notes:
1. Do not drop dowel.
2. Make sure that the arrow on the pick-up roller points in the correct direction when the pick-up roller is mounted.

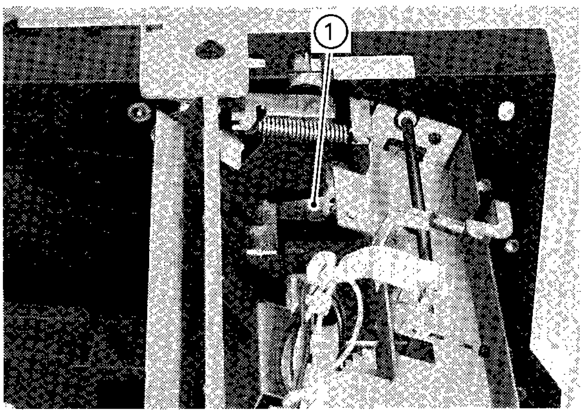


① E rings ② Pick-up roller

Figure 4-316

■ Notes on reassembly

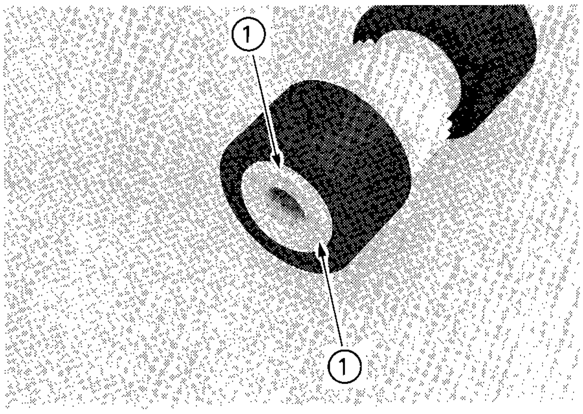
a. Mount the pick-up roller unit above the pick-up roller engage lever.



① Pick-up roller engage lever

Figure 4-317

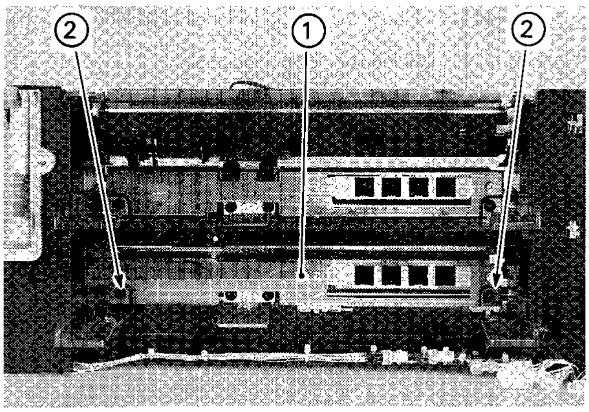
b. Mount the separation roller so that the section shown in Figure 4-318 is toward the inner side of the cassette holder (away from you in the copier).



① Section

Figure 4-318

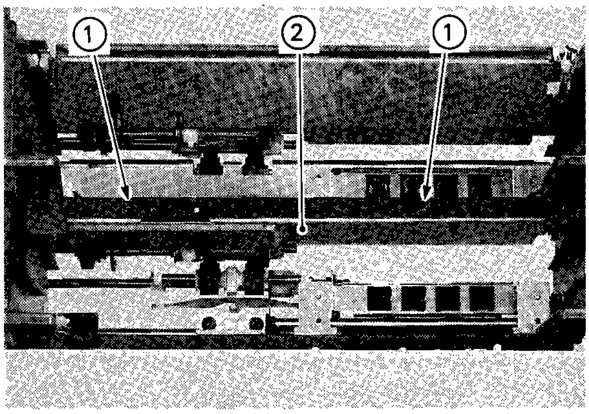
6. Removing the lower separation/feed/pick-up rollers
   1) Remove the cassette holder from the copy.
   2) Remove the two mounting screws then lower pick-up guide plate I.



① Lower pick-up guide plate I
② Mounting screws

Figure 4-319

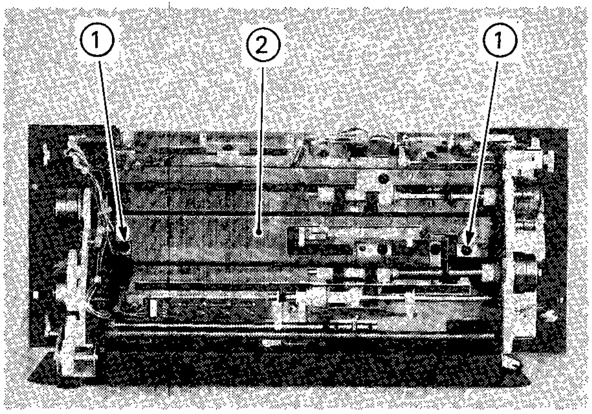
3) Remove the two mounting screws then lower pick-up guide plate II.



① Mounting screws
② Lower pick-up guide plate II

Figure 4-320

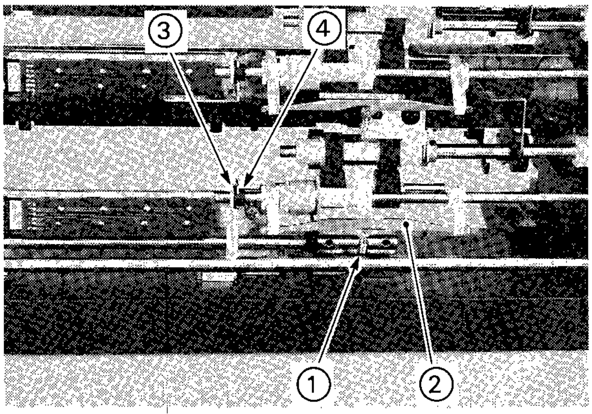
4) Remove the two mounting screws then the pick-up guide plate.



① Mounting screws
② Pick-up guide plate

Figure 4-321

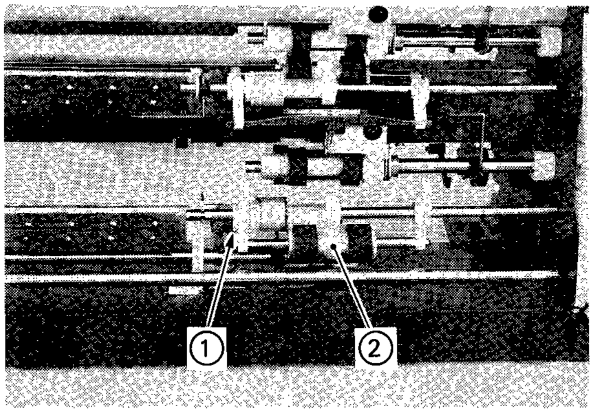
5) Remove the spring then the spring hook plate.
6) Remove the retaining ring then the bushing.



① Spring
② Spring hook plate
③ Retaining ring
④ Bushing

Figure 4-322

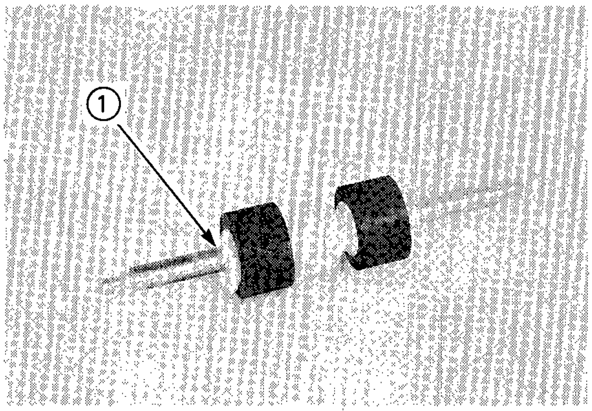
7) Press the separation roller shaft toward the front side plate then pull it out.
8) Remove the retaining ring then the separation roller unit.



① Retaining ring
② Separation roller unit

Figure 4-323

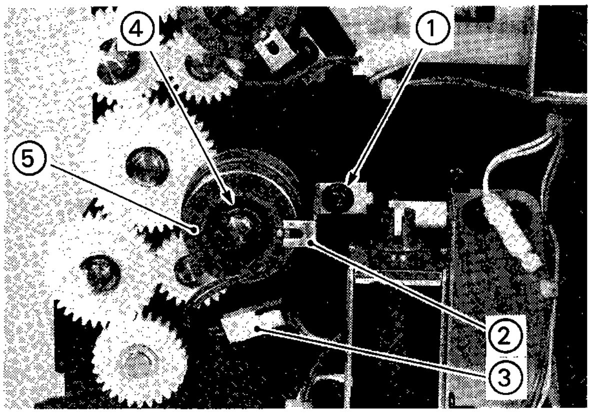
9) Remove the retaining ring then the separation roller.



① Retaining ring

Figure 4-324

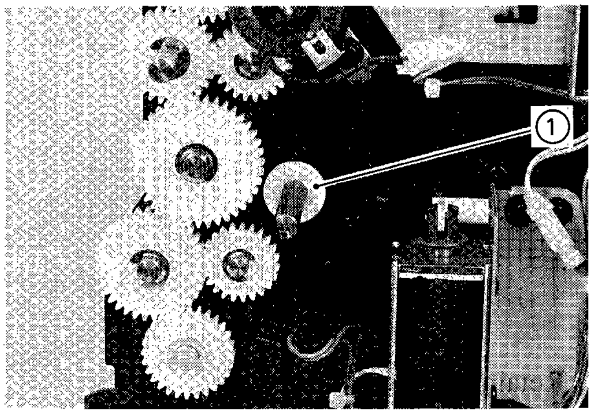
10) Remove the mounting screw then the clutch lock plate.
11) Remove the connector, the grip ring, then the lower pick-up roller clutch.



① Mounting screw
② Clutch lock plate
③ Connector
④ Grip ring
⑤ Lower pick-up roller clutch

Figure 4-325

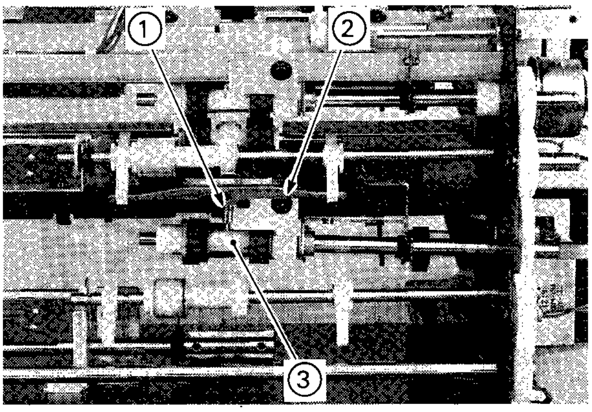
12) Remove the ball bearing



① Ball bearing

Figure 4-326

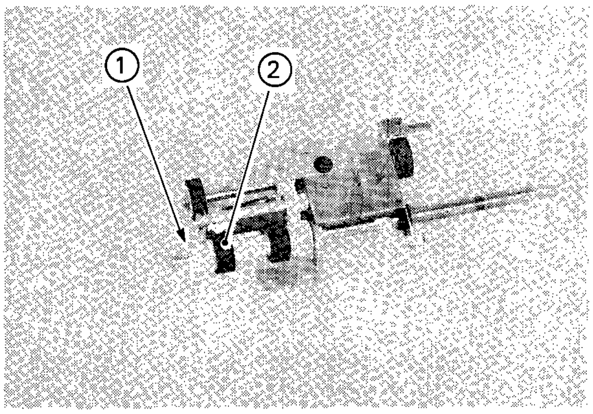
13) Remove the two springs.
14) Remove the mounting screw then the pick-up roller unit.



① Springs
② Mounting screw
③ Pick-up roller unit

Figure 4-327

15) Remove the retaining ring then the feed roller.

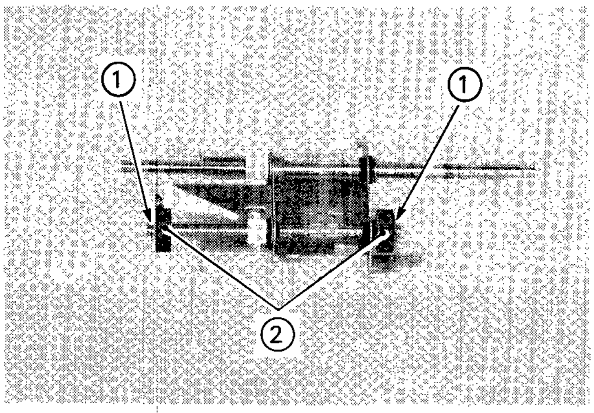


① Retaining ring ② Feed roller

Figure 4-328

16) Remove the two E rings then the two pick-up rollers.

Notes:
1. Be careful not to lose the dowel.
2. Make sure that the arrow on the pick-up roller points in the correct direction when the pick-up roller is mounted.

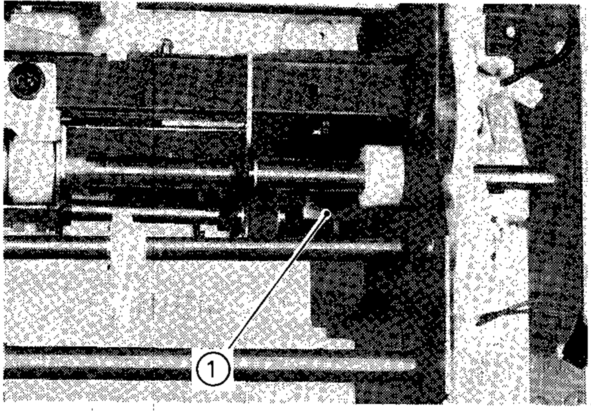


① E rings ② Pick-up roller

Figure 4-329

■ Notes on reassembly

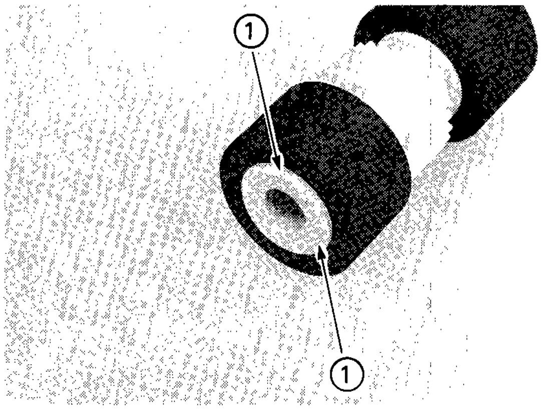
a. Mount the pick-up roller unit above the pick-up roller engage lever.



① Pick-up roller engage lever

Figure 4-330

b. Mount the separation roller so that the section shown in Figure 4-331 is toward the inner side of the cassette holder (away from you in the copier).



① Section

Figure 4-331

7. Adjusting solenoid strokes

Mount the solenoid so that the distance between the top of plunger and the center of the hole is the value shown in the figure below.

a. Mounting position of lower pick-up roller engage solenoid

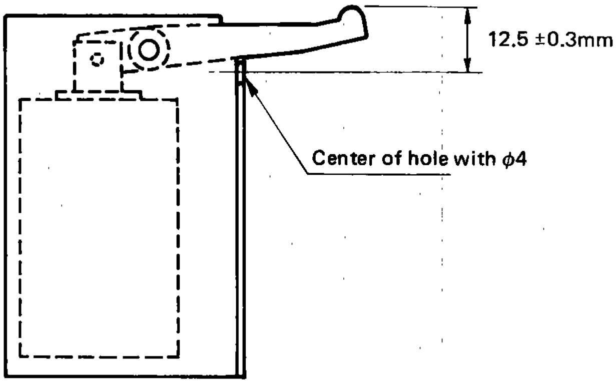


Figure 4-332

b. Mounting position of upper pick-up roller engage solenoid

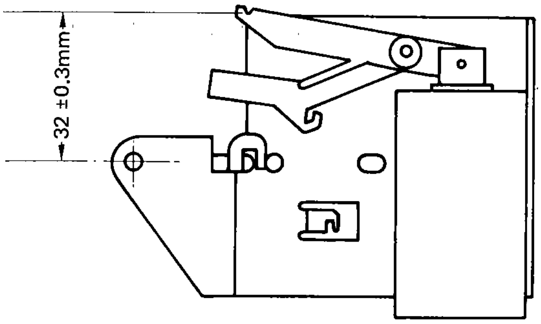
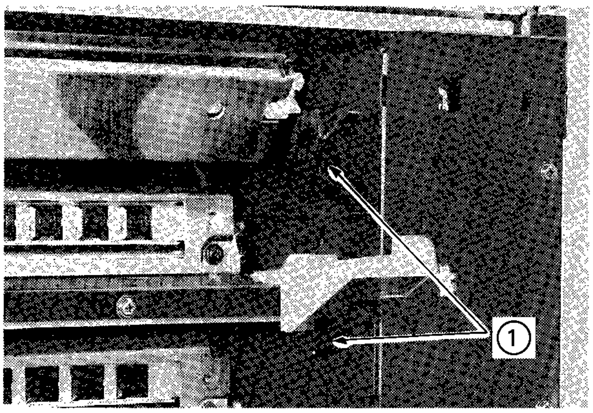


Figure 4-333

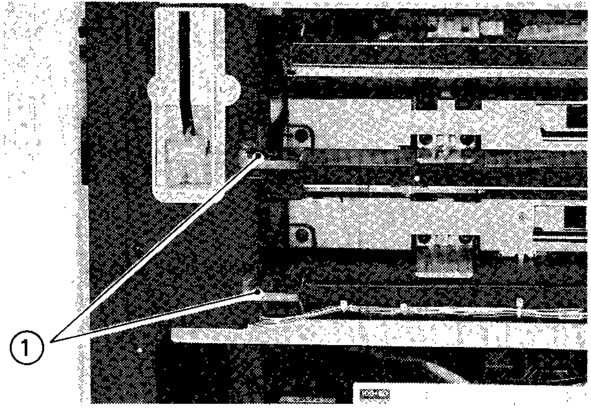
8. Releasing the lifter
Push up the levers shown in the figure to raise or lower the lifter.



① Levers

Figure 4-334

9. Adjusting the cassette position
To adjust the cassette position, move the cassette holder shown in the figure to the right or left.



① Cassette holder

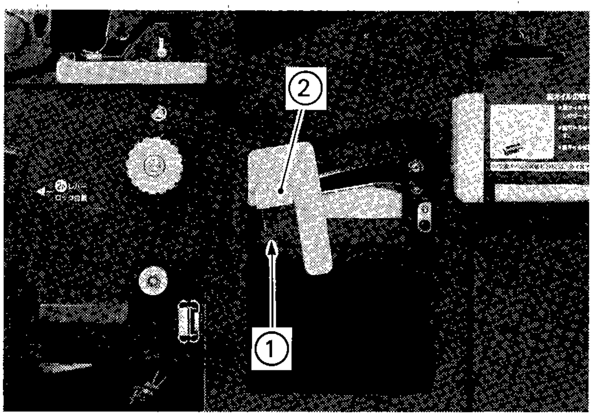
Figure 4-335

If the cassette holder is moved to the left, make sure that the cassette can be pushed in smoothly all the way.

10. Oiling
Oil the one-way clutch unit with lubricating oil.

B. Registration Roller Unit

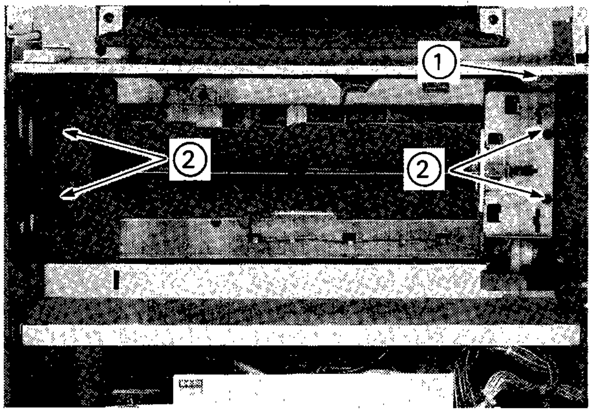
1. Removing the registration roller unit
 1) Remove the mounting screw then the release handle.



① Mounting screw
② Release handle

Figure 4-336

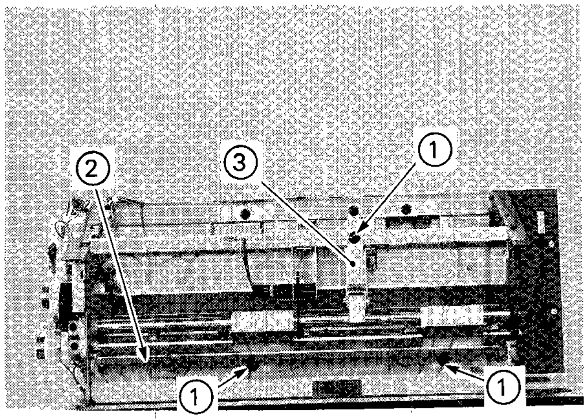
 2) Remove the cassette holder.
 3) Disconnect the connector.
 4) Remove the four mounting screws, and pull out the registration roller unit toward you.



① Connector ② Mounting screws

Figure 4-337

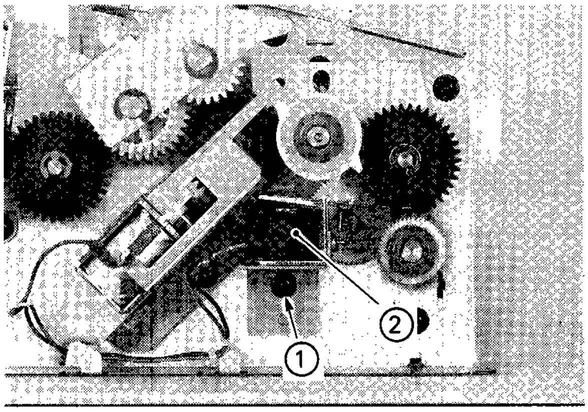
2. Removing the registration roller
1) Remove the registration roller unit from the copier.
2) Remove the two mounting screws then the paper guide plate.
3) Remove the mounting screw then the pressure plate.



① Mounting screws
② Paper guide plate
③ Pressure plate

Figure 4-338

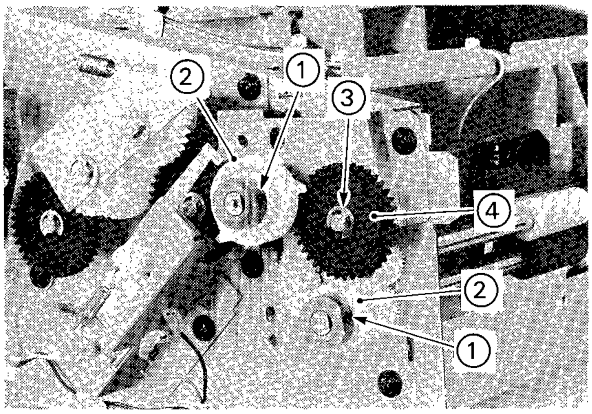
4) Remove the mounting screw then the registration roller clutch solenoid.



① Mounting screw
② Registration roller clutch solenoid

Figure 4-339

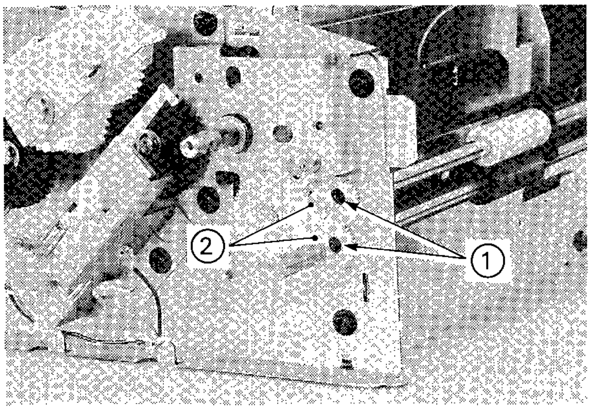
5) Remove the setscrews then the clutch.
6) Remove the E ring and gear.



① Setscrews	③ E ring
② Clutch units	④ Gear

Figure 4-340

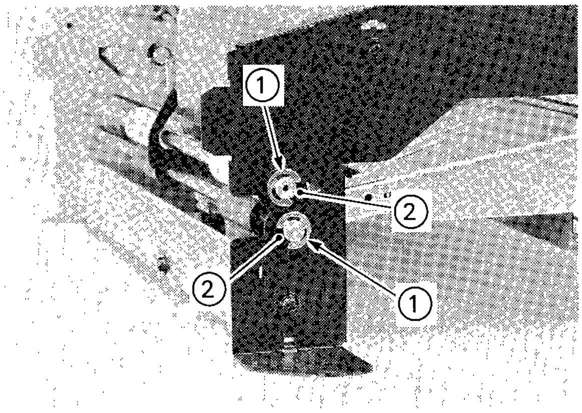
7) Remove the two mounting screws then the gear and bushing.



① Mounting screws ② Gear

Figure 4-341

8) Remove the E rings, bushings, then the registration roller.



① E rings ② Bushings

Figure 4-342

3. Adjusting the solenoid position

Mount the solenoid as shown in the figure below.

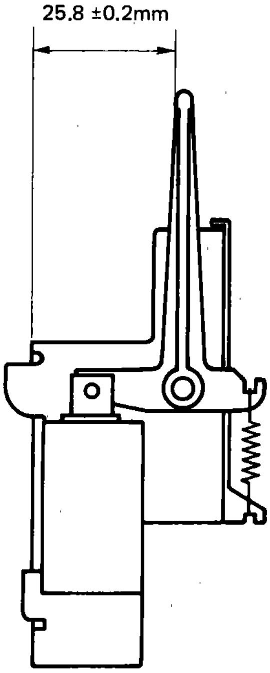


Figure 4-343

4. Oiling

Oil the spring clutch unit with low viscosity lubricating oil.

C. Transfer Drum Unit

1. Construction

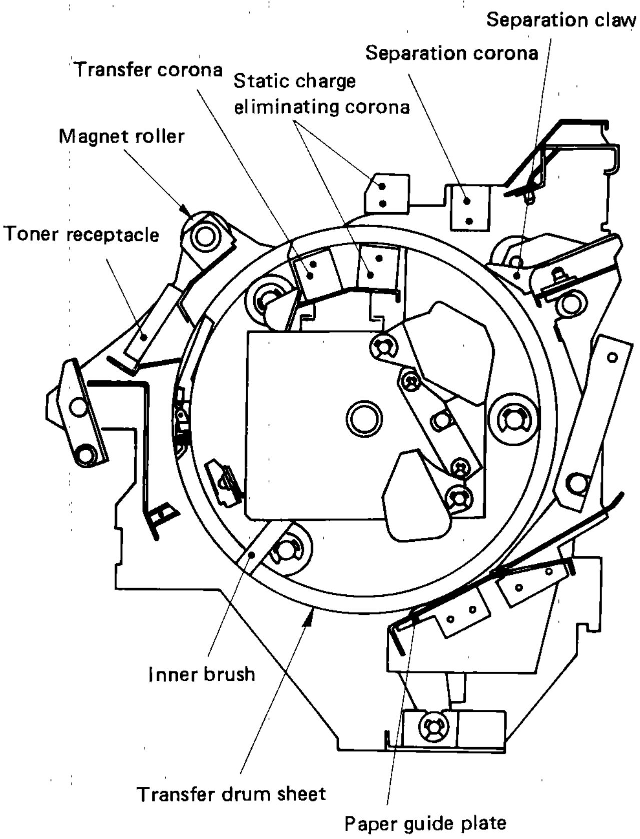
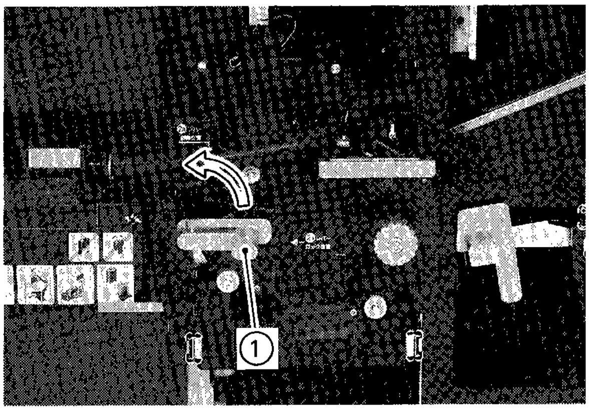

Separation claw
Separation corona
Transfer corona
Static charge eliminating corona
Magnet roller
Toner receptacle
Inner brush
Transfer drum sheet
Paper guide plate

Figure 4-344

2. Removing the transfer drum unit from the copier

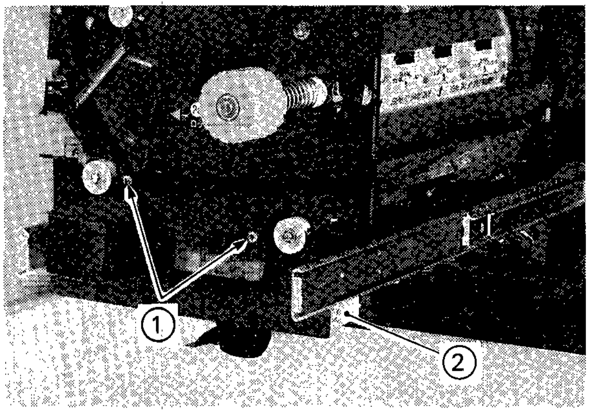
1) Turn the release handle counterclockwise.



① Release handle

Figure 4-345

2) Pull the transfer drum unit toward you.
3) Remove the two stepped screws, grounding wire and disconnect the connector.



① Stepped screws ② Connector

Figure 4-346

4) Hold the release handle shaft and crossmember and pull up the transfer drum unit.

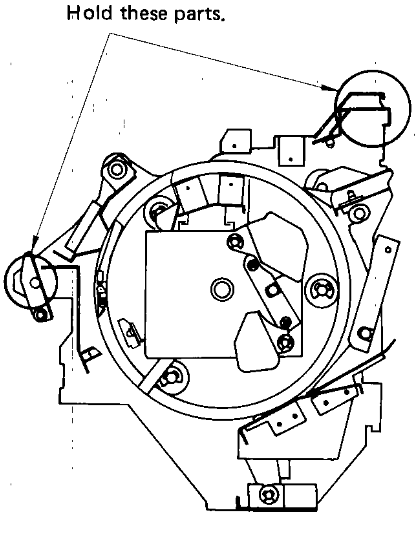


Figure 4-347

3. Replacing the transfer drum sheet
1) Strip off the old sheet from the transfer drum.
2) Strip off the old double-sided adhesive tape from the transfer drum and clean the adhesive faces of the tape with alcohol.
3) Tilt the transfer drum unit as shown in Figure 4-348.

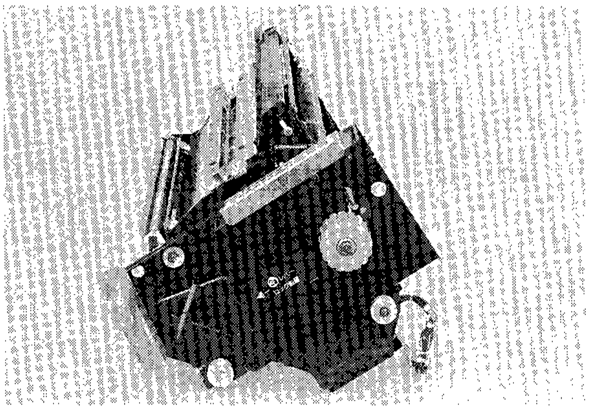
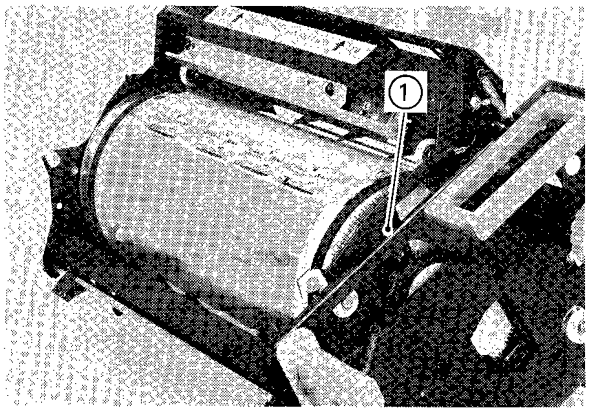


Figure 4-348

4) Remove the transfer corona/inner static charge eliminating corona and waste toner receptacle.
5) Open the separation/outer static charge eliminating corona.
6) Insert a gripper opener (TKN-0458) or screwdriver to the transfer corona/inner static charge eliminating corona rail of the transfer drum unit to open the gripper.



① Gripper opener

Figure 4-349

7) Attach the tape (FY1-0579-000) to the transfer drum as shown in Figure 4-350.

8) Cut the tape indicated by oblique lines in Figure 4-350a as shown.

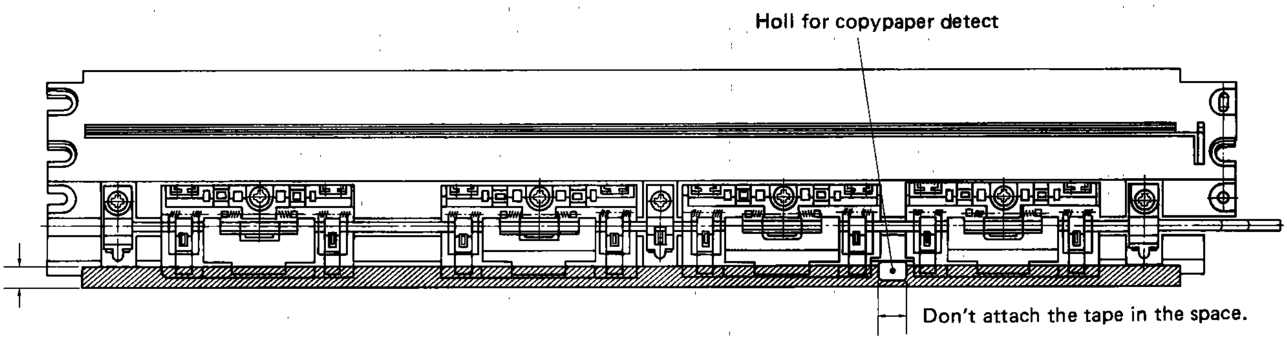

Holl for copypaper detect
Don't attach the tape in the space.

Figure 4-350

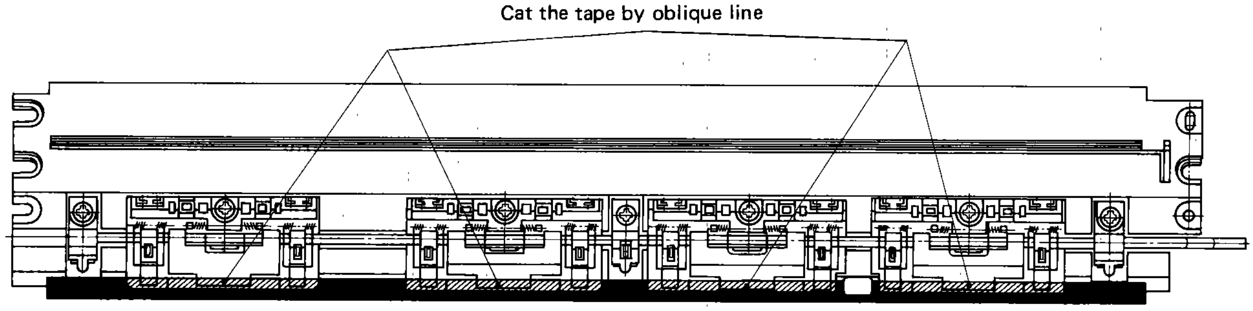

Cat the tape by oblique line

Figure 4-350a

9) Attach the tapes as shown in Figure 4-350b.

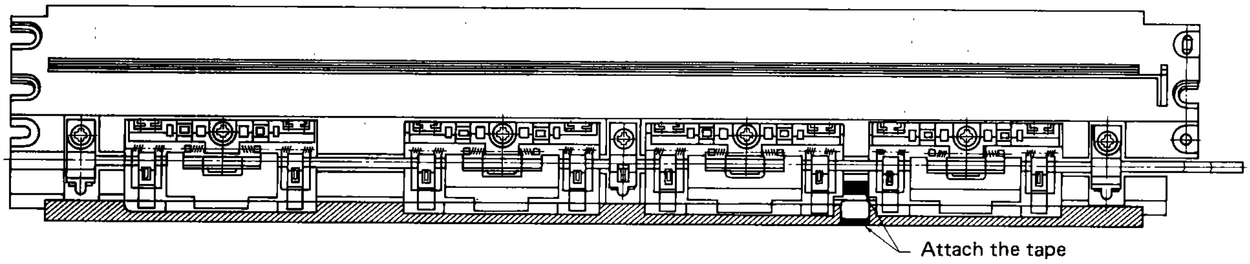

Attach the tape

Figure 4-350b

10) Attach the new transfer drum sheet so that the lower parts (b) of square holes are aligned with the end (a) of the gripper.

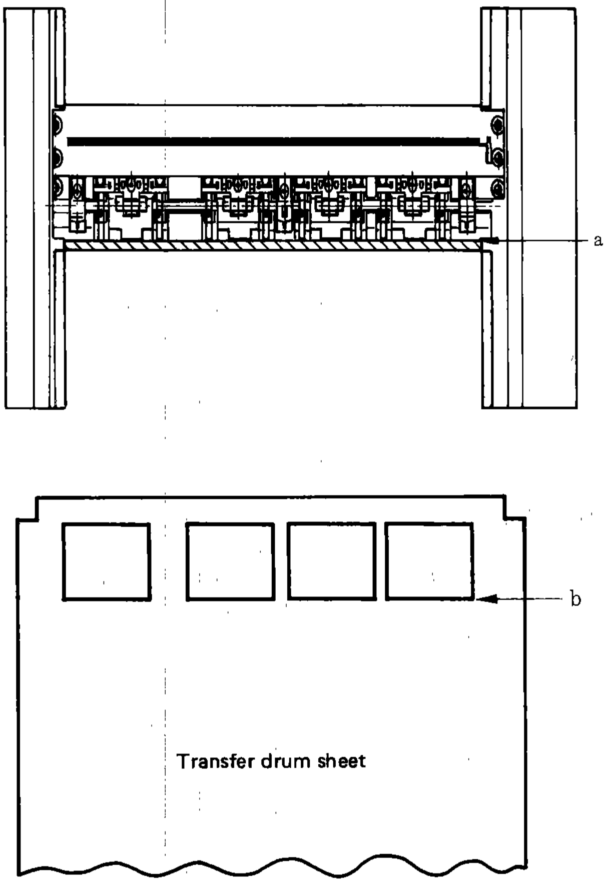


Figure 4-351

11) Attach the transfer drum sheet by pressing the part indicated by oblique lines in Figure 4-352 as shown.

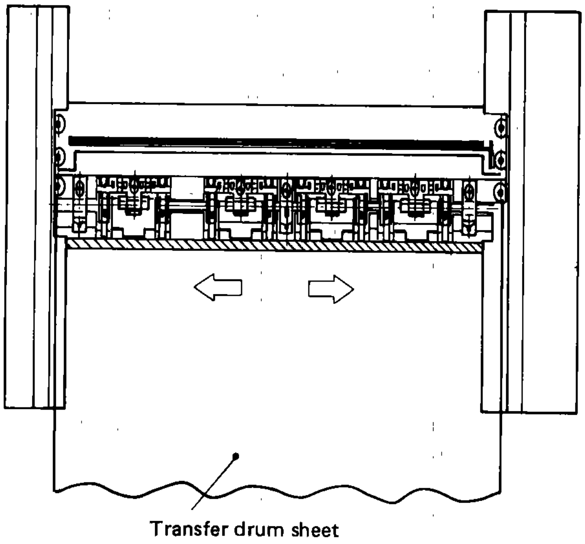


Figure 4-352

12) While pulling the leading edge of the transfer drum sheet as shown, attach the leading edge of the sheet by pressing it firmly by hand.
Make sure that the folding part of the transfer drum sheet meets the gripper holes.

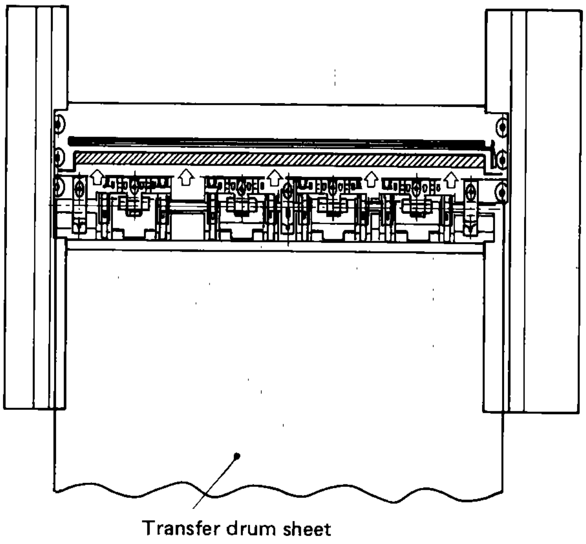


Figure 4-353

13) Remove the gripper opener or screwdriver from the transfer drum unit.
14) While lightly pulling the trailing edge of the transfer drum sheet, turn the transfer drum knob and attach the transfer drum sheet.
Make sure that there are no creases in the sheet or air between the sheet and the drum.

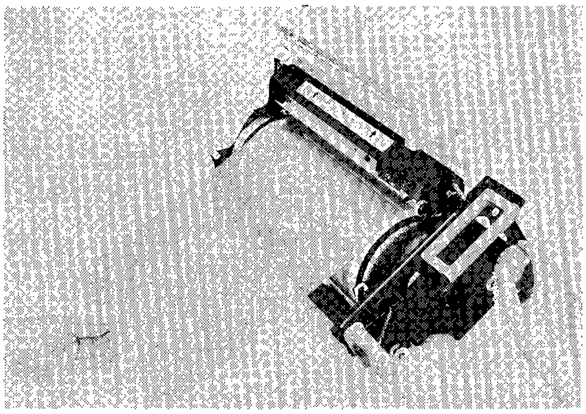


Figure 4-354

15) Attach the transfer drum sheet until the gripper reaches the transfer corona position.
16) Attach the transfer sheet while pressing both sides of the sheet against the flanges with your thumbs.

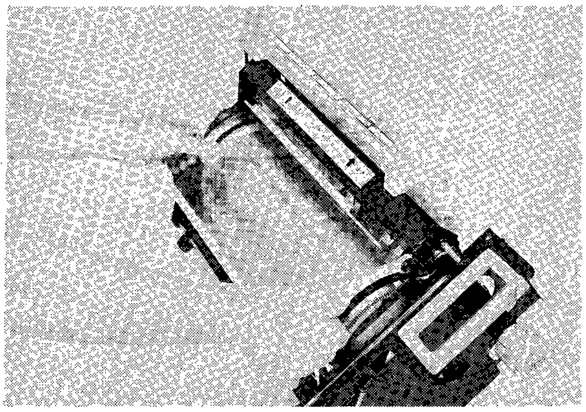


Figure 4-355

17) Press the center of the trailing edge of the transfer drum sheet and press the trailing edge toward both sides.

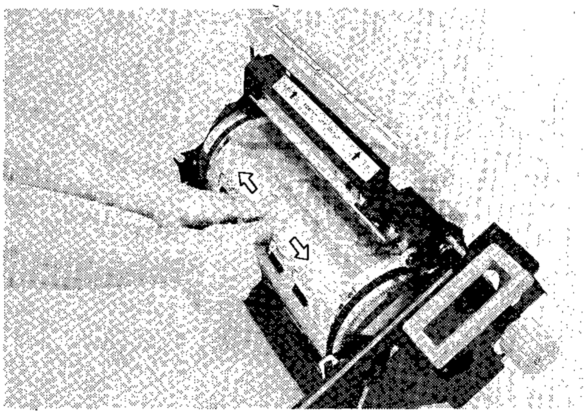


Figure 4-356

18) Lightly press down the part of the transfer drum sheet as shown in Figure 4-357 and make sure that the leading edge of the transfer drum sheet is not raised.

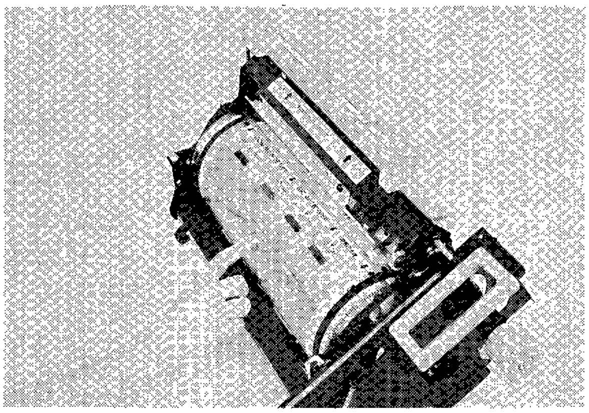


Figure 4-357

19) Make sure that the transfer drum sheet is attached to the flanges of the transfer drum.
20) Place a 35-cm or longer ruler along the spacer rubbers placed at the front and rear transfer drums, and make sure that the transfer drum sheet is not raised or loose. If the sheet is loose for about 0.5 mm or more (target is 0.3 mm), reattach the sheet to prevent transfer faults.

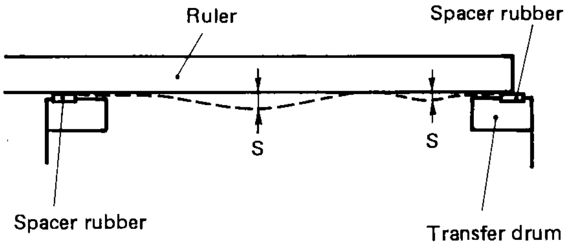


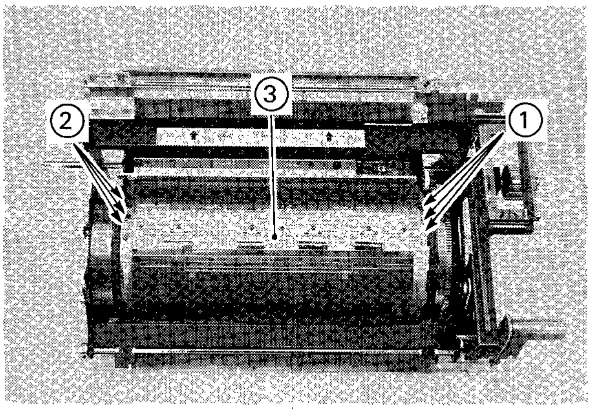
Figure 4-358

21) Move the gripper shaft and make sure that the gripper opens and closes smoothly.

4. Gripper unit

a. Removing the gripper unit

1) Remove the transfer drum unit from the copier.
2) Remove the transfer drum sheet.
3) Remove the three front screws fastening the gripper unit.
4) Loosen the three rear screws fastening the gripper unit, and remove the gripper unit.

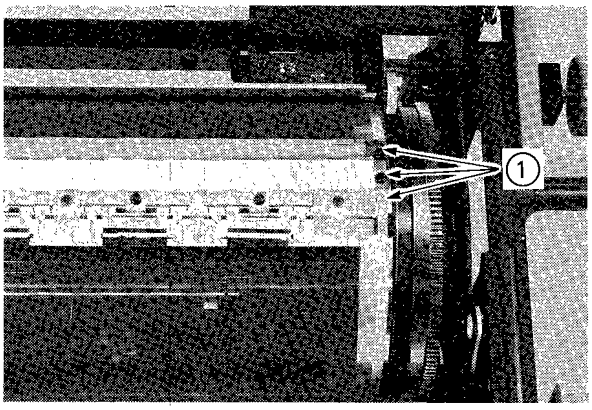


① Remove
② Loosen
③ Gripper unit

Figure 4-359

b. Remounting the gripper unit

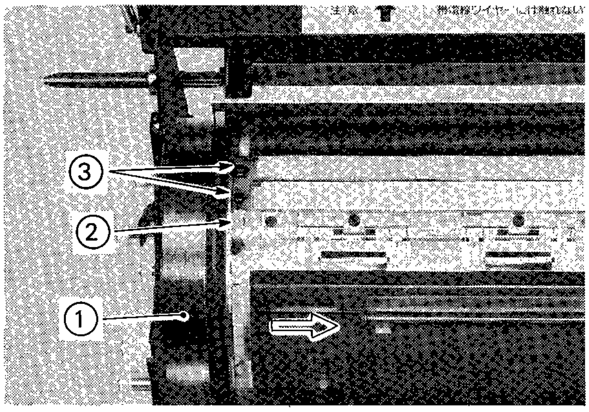
1) Place the gripper unit on the flanges of the transfer drum.
2) Fasten the front of the gripper unit with three screws.



① Screws

Figure 4-360

3) While pressing the rear flange toward the front, tighten screw A. Make sure that the flange is not tilted.
4) Tighten the remaining two screws to fasten the gripper unit.

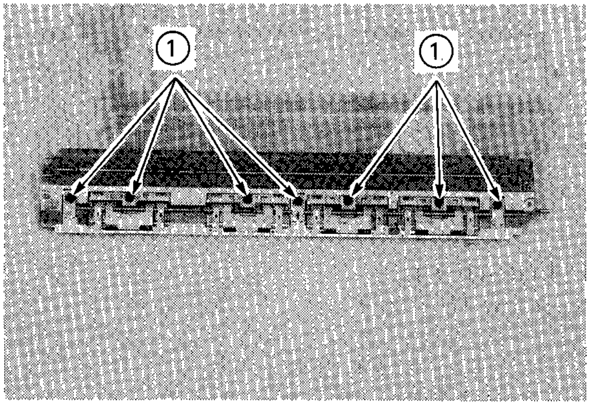


① Rear flange
② Screw A
③ Screws

Figure 4-361

c. Removing the gripper

1) Remove the gripper unit from the transfer drum.
2) Remove the seven mounting screws and remove the gripper shaft holding plate.



① Mounting screws
② Gripper shaft holding plate

Figure 4-362

3) Turn the gripper clockwise for 180° and remove the gripper from the shaft.

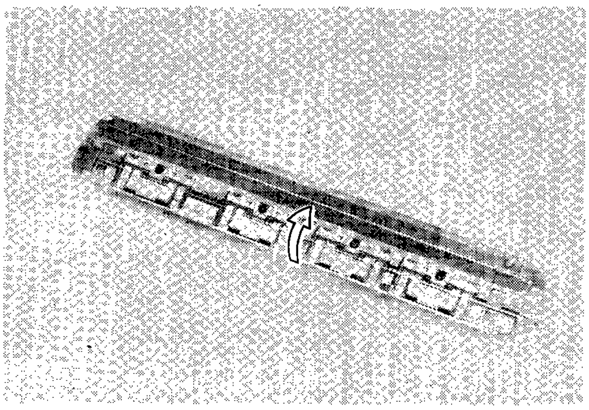
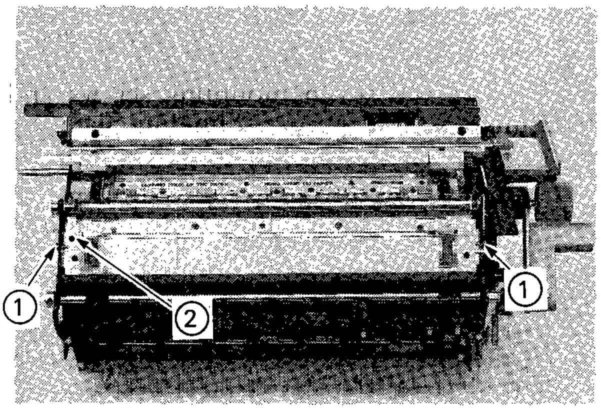


Figure 4-363

5. Toner receptacle unit

a. Removing the toner receptacle unit

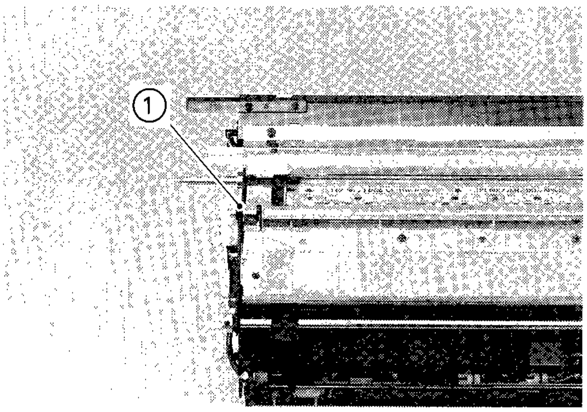
1) Remove the transfer drum unit from the copier.
2) Remove the three mounting screws.



① Flat screws
② Screw (M3 × 6)

Figure 4-364

4) Move the bushing from the back to front and remove the toner receptacle unit.



① Bushing

Figure 4-365

c. Blade position

Attach the blade as shown in the figure below.

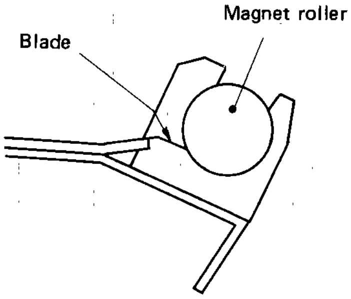

Magnet roller
Blade

Figure 4-366

d. Toner catcher sheet

Attach the toner catcher sheet in the standard position.

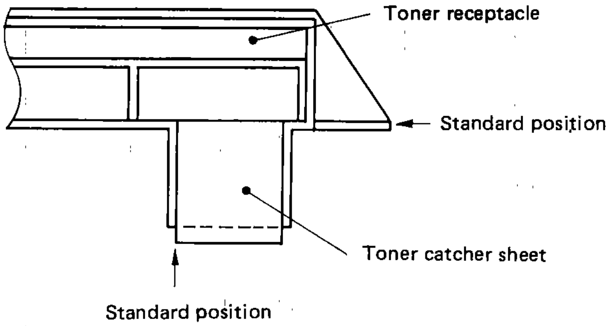
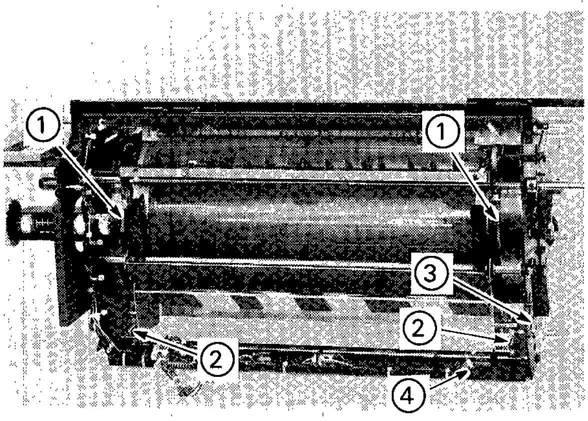

Toner receptacle
Standard position
Toner catcher sheet
Standard position

Figure 4-367

6. Pick-up guide plate and separation claw unit

a. Removing the pick-up guide plate and separation claw unit

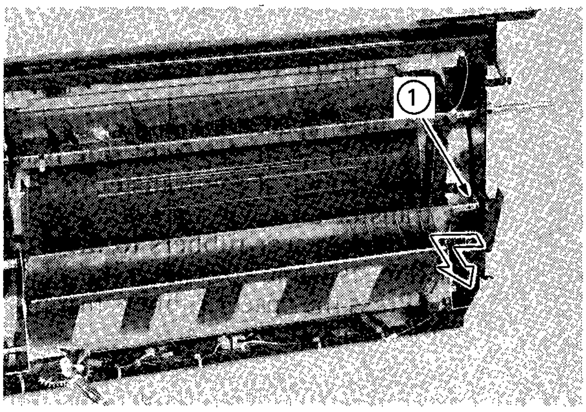
1) Remove the transfer drum unit from the copier.
2) Remove the five springs.
3) Remove the mounting screw then the toothed lock washer and ground wire.



① Spring (medium)
② Spring (large)
③ Spring (small)
④ Mounting screw (M3 × 6)

Figure 4-369

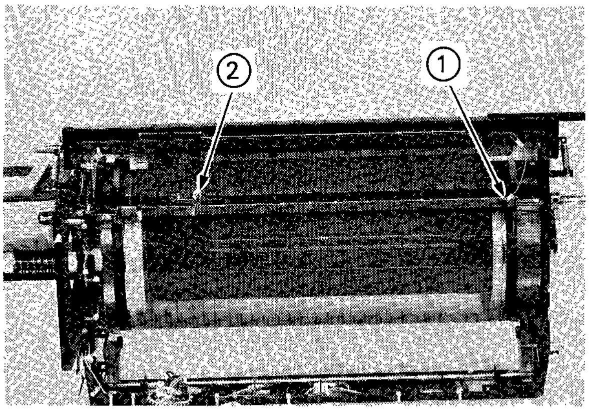
4) Remove the E ring.
5) Move the pick-up guide plate as shown in Figure 4-370, and remove the pick-up guide plate.



① E ring

Figure 4-370

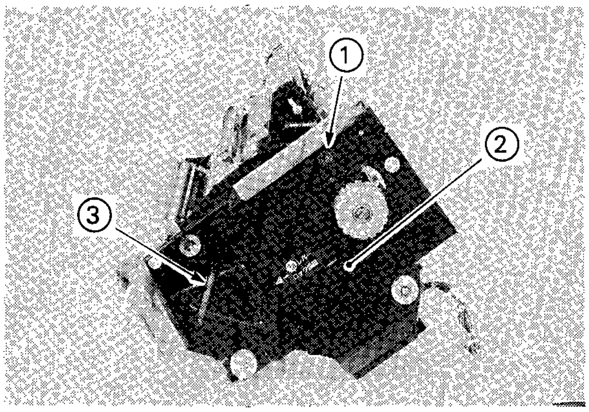
6) Remove the mounting screw then the toothed lock washer and ground wire.
7) Disconnect the connector.



① Mounting screw (M3 × 6mm)
② Connector

Figure 4-371

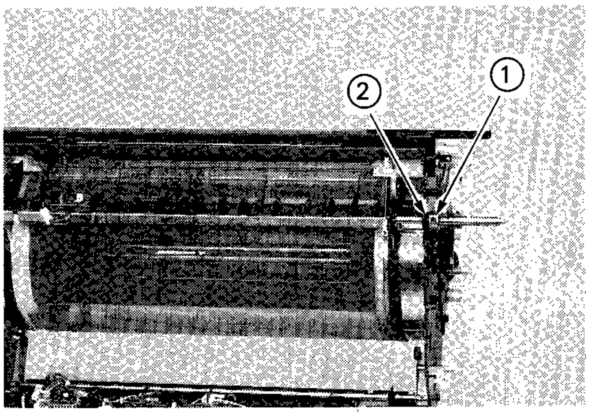
8) Remove the two E rings then the spacer.
9) Remove the spring then the centering plate.



① E rings
② Centering plate
③ Spring

Figure 4-372

10) Remove the thrust stopper and bushing, and remove the separation claw unit.



① Thrust stopper ② Bushing

Figure 4-373

b. Separation claw mounting position

Adjust the plate to which the roller is attached, so that the separation claw is against the transfer drum sheet as shown in the figure below.

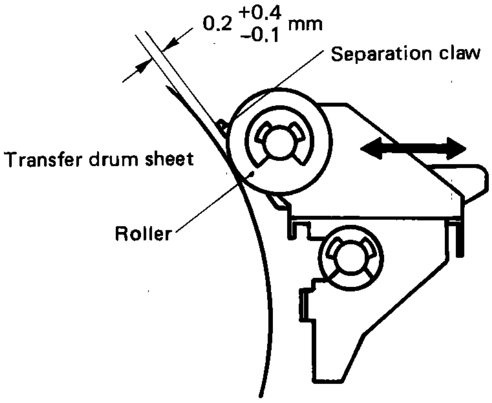
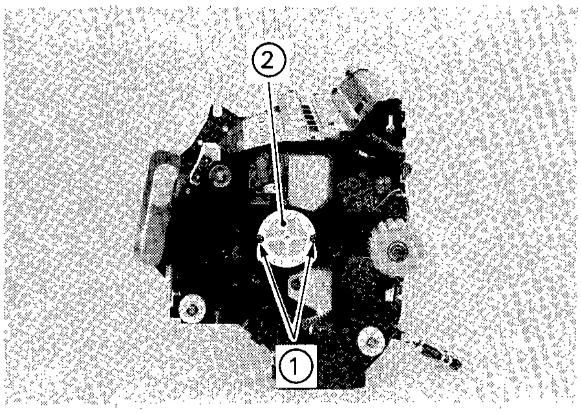


Figure 4-374

7. Replacing the spacer rubber

Generally, it is not required to replace the spacer rubber. If the spacer rubber snaps, replace it as described below (this should be done in a workshop).

1) Remove the transfer drum unit from the copier.
2) Remove the transfer drum sheet from the transfer drum.
3) Remove the toner receptacle unit.
4) Remove the pick-up guide plate and centering plate.
5) Remove the separation claw unit.
6) Cut the spacer rubber at the flange with a knife.
7) Stand the transfer drum unit upright on its rear side.
8) Remove the two mounting screws then the bushing of the transfer drum.



① Mounting screws
② Bushing

Figure 4-375

9) Insert two new spacer rubbers from the hole of the bushing at the front side plate.
10) Mount the bushing of the transfer drum.
11) Lay the transfer drum on its side.
12) Attach the new spacer rubbers to the front and rear flanges while stretching the spacer rubbers. (Press the spacer rubbers firmly all around the flanges).
13) Mount the separation claw unit, pick-up guide plate, centering plate, and waste toner receptacle unit.
14) Attach the new transfer drum sheet.

8. Gripper cam mounting position

Attach the gripper cam as shown in the figure below. Becase the gripper cam is attached at the standard position, minute adjustment is required if a separation error occurs.

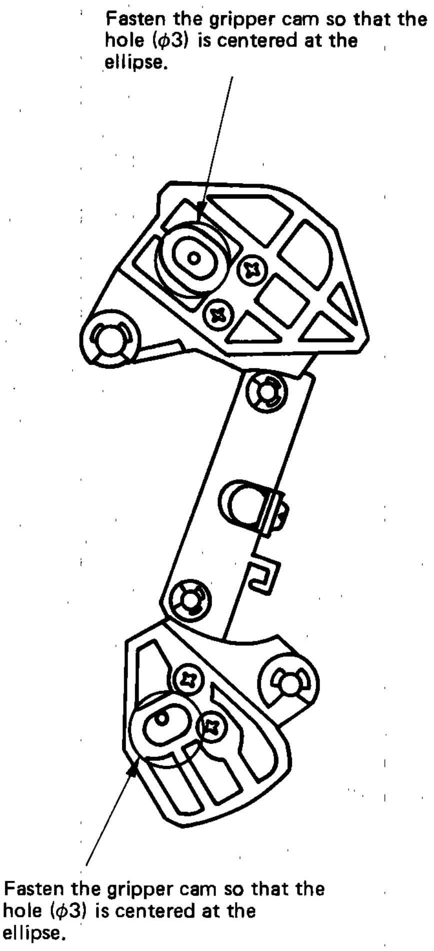
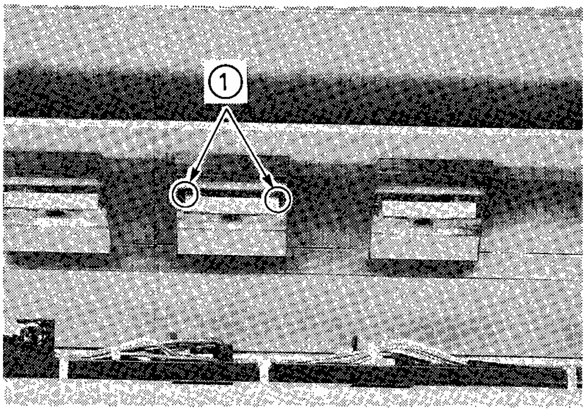

Fasten the gripper cam so that the hole (ϕ3) is centered at the ellipse.
Fasten the gripper cam so that the hole (ϕ3) is centered at the ellipse.

Figure 4-376

After adjusting the gripper cam, make sure that the inner corners of the gripper do not protrude past the transfer drum sheet.



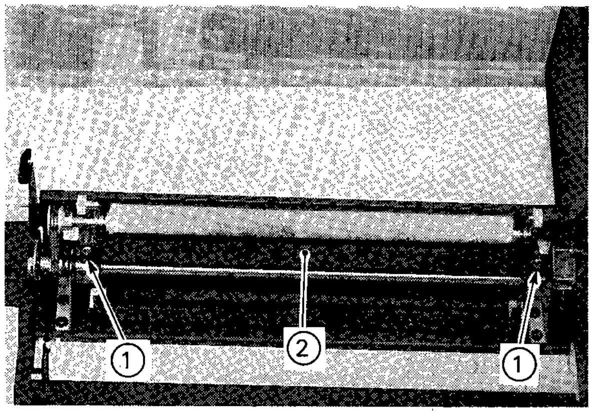
① Gripper corners

Figure 4-377

9. Inner brush mounting position

Place a ruler between the front and rear flanges and mount the inner brush so that the edge of the brush lightly touches the ruler.

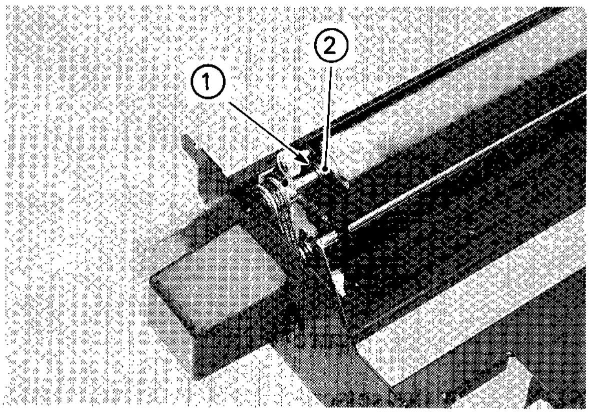
10. Removing the outer cleaning brush
1) Remove the transfer drum unit.
2) Remove the two flat screws then the crossmember.



① Flat screws ② Crossmember

Figure 4-378

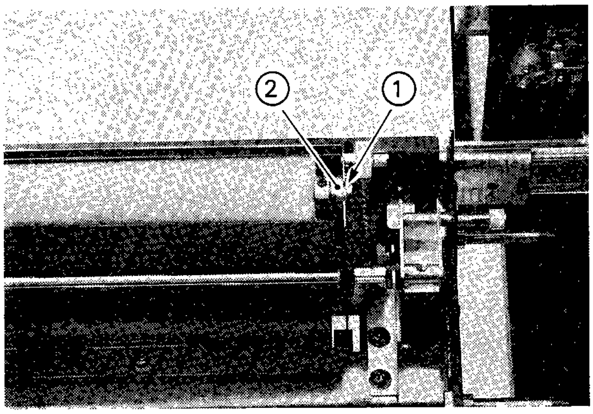
3) Remove the E ring and pull the ball bearing toward you.



① E ring ② Ball bearing

Figure 4-379

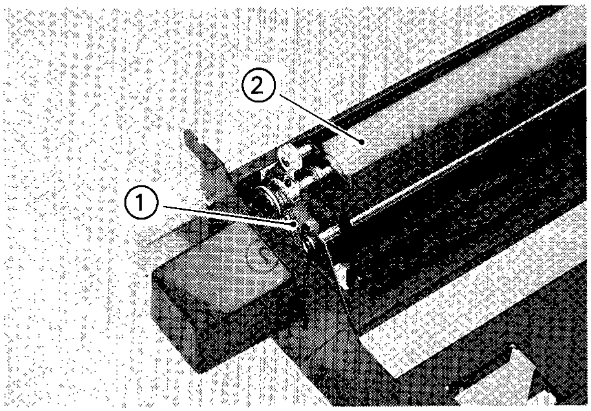
4) Remove the E ring then the ball bearing.



① E ring ② Ball bearing

Figure 4-380

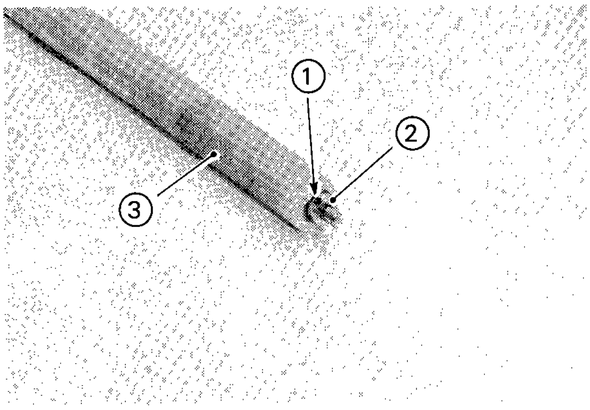
5) Remove the front belt then the outer cleaning brush unit.



① Belt
② Outer cleaning brush

Figure 4-381

6) Loosen the setscrew and remove the collar and outer cleaning brush.

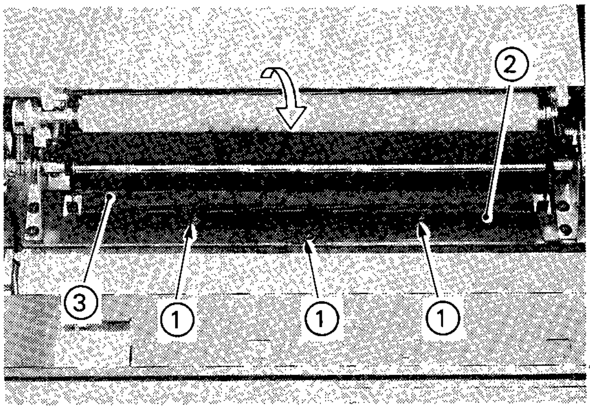


① Setscrew
② Collar
③ Outer cleaning brush

Figure 4-382

The procedure for mounting the outer cleaning brush is the opposite of the procedure used to remove it. Place the crossmember so that the tops of both ends are even.

11. Removing the toner receptacle from the outer cleaning brush unit
 1) Remove the transfer drum unit.
 2) Remove the two mounting screws, and remove the seal support plate.
 3) Remove the mounting screw of the toner receptacle, turn the outer cleaning brush unit clockwise, and remove the toner receptacle.

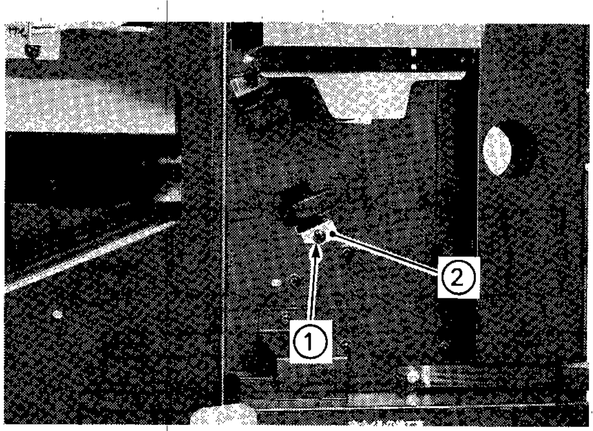


① Mounting screw
② Seal support plate
③ Toner receptacle

Figure 4-383

D. Feeder Assembly

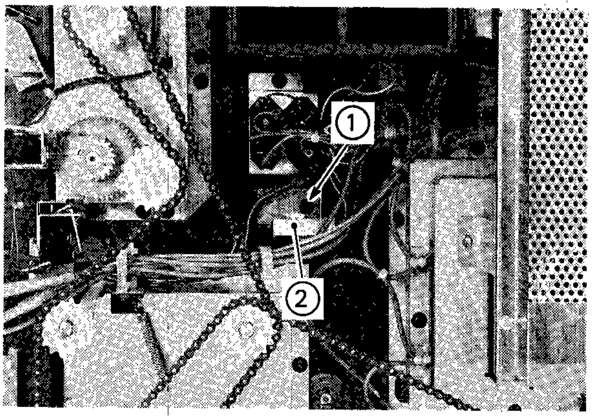
1. Removing the feeder assembly
   1) Remove the fixing assembly.
   2) Remove the pre-fixing coronas.
   3) Remove the mounting screw then the support plate of the pre-fixing corona (lower).



① Mounting screw
② Support plate

Figure 4-384

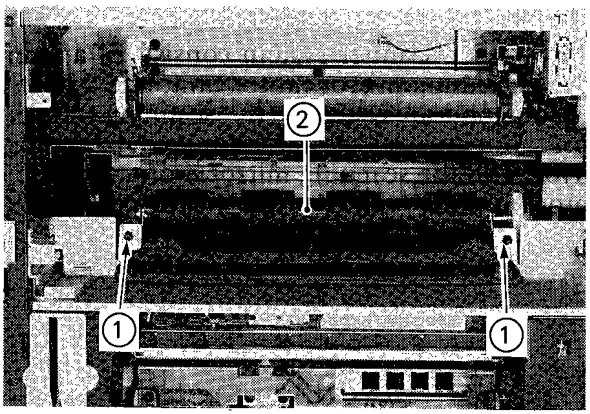
   4) Remove the mounting screw, and disconnect the feeder fan connector.



① Connector
② Mounting screw

Figure 4-385

   5) Remove the two mounting screws then the feeder assembly.



① Mounting screw
② Feeder assembly

Figure 4-386

IV. EXPOSURE SYSTEM

A. Laser/Scanning Mirror Motor Unit

1. Construction

The laser/scanner system consists of a laser unit, a scanning mirror motor unit, and a beam focusing optical system. The scanning mirror motor unit consists of a prism mirror (scanning mirror) and the scanning mirror motor (scanner motor). Do not remove the mirror cover that covers the upper part of the unit.

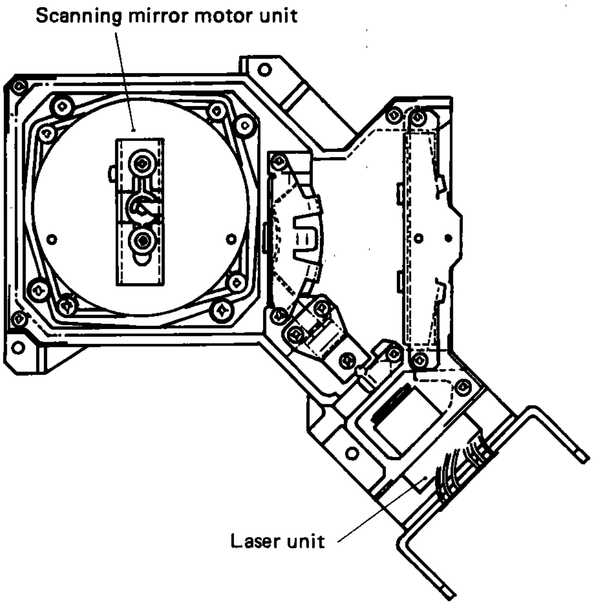


Figure 4-400

2. Removing the laser/scanning mirror motor unit

Notes:

1. When servicing the laser/scanning mirror motor unit or the scanning mirror motor, be sure to unplug the printer power cord before beginning work.
2. To prevent electrostatic destruction of the laser, connect the laser jumper connector (TKN-0406) to the connector of the removed laser unit. Do not remove the laser jumper connector until connecting the laser unit to the laser driver.
3. When removing or attaching the laser/scanning mirror motor unit, be careful not to scratch the scanning mirror motor drive PCB.
4. Do not tilt the laser/scanning mirror motor unit excessively or turn it upside down when the lock of the scanning mirror motor is released.

1) Slide the top cover of the copier to the right.
2) Make sure that the scanning mirror motor has stopped rotating, push down the scanning mirror motor unit shaft, and loosen the screw of the scanning mirror drive motor lock plate. Then, slide the lock plate as shown to lock the scanning mirror motor.

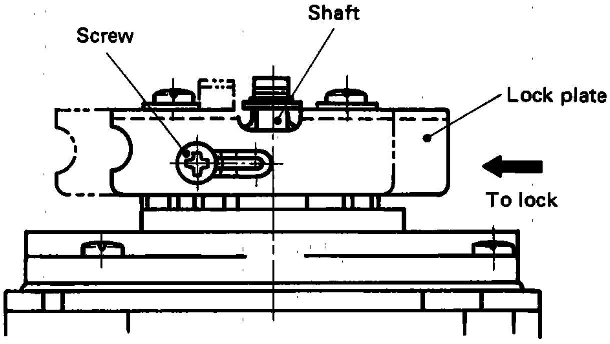
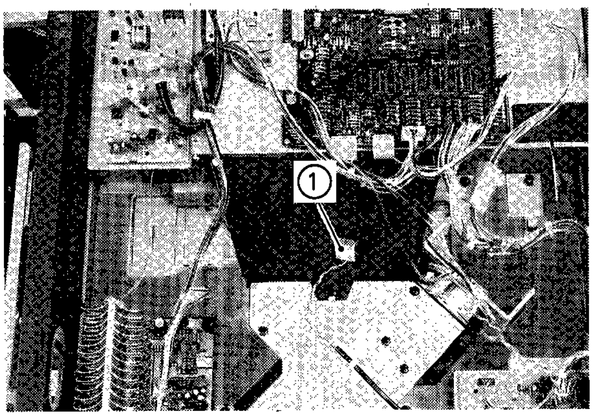


Figure 4-401

3) Unplug connector J109 from the DC controller PCB, and plug the jumper connector (TKN-0406) into laser unit connector J109.

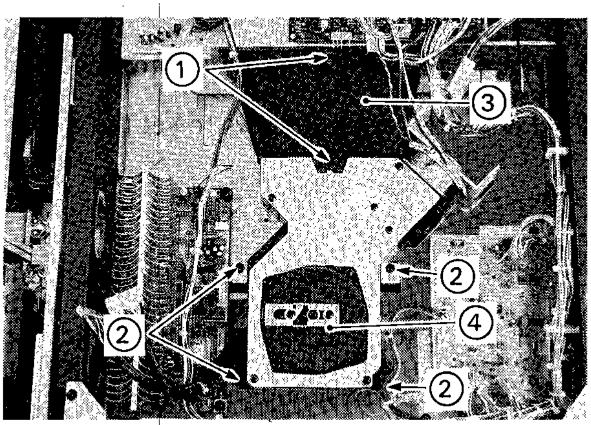


① Jumper Connector

Figure 4-402

4) Unplug connector J205 from the DC driver PCB.
5) Unplug connectors J202 and J203 from the scanning mirror motor drive PCB.

6) Remove the two screws and take out the optical path unit.
7) Remove four screws and take out the laser/scanning mirror motor unit.

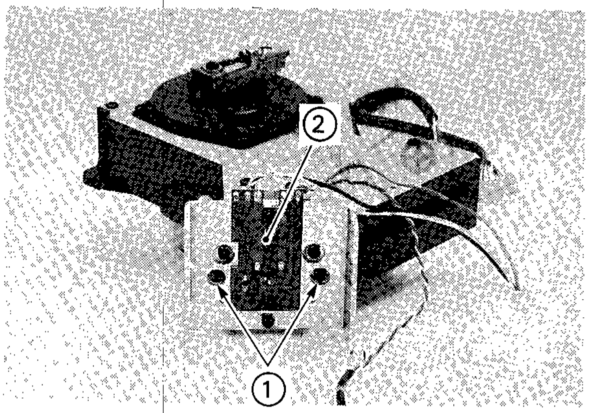


① Screws (M4×6)
② Screws (M4×12)
③ Optical path unit
④ Laser/scanning mirror motor unit

Figure 4-403

> **Note:**
> Before installing the laser/scanning mirror motor unit, thoroughly clean the mounting surfaces.

3. Removing the laser unit
   1) Remove the laser/scanning mirror motor unit from the copier.
   2) Loosen setscrews and take out the laser unit.

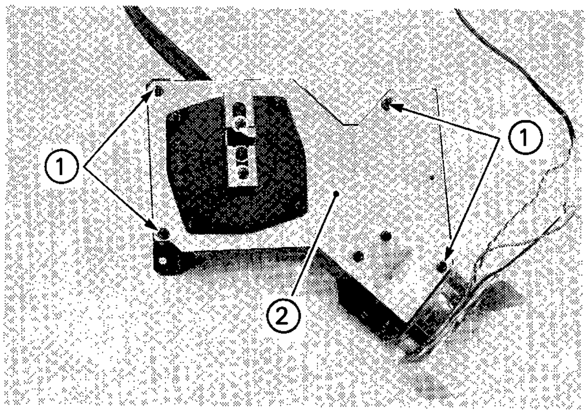


① Setscrews ② Laser unit

Figure 4-404

> **Note:**
> Pay attention not to touch, crack, or allow dust to get on the mounting face of the laser unit.

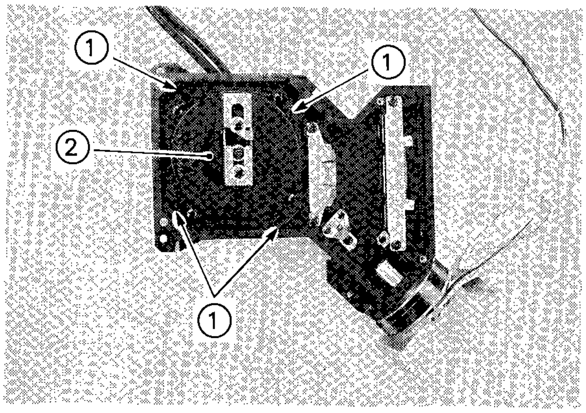
4. Removing the scanning mirror motor unit
   1) Remove the laser/scanning mirror motor unit from the copier.
   2) Remove four screws then the top cover of the laser/scanning mirror motor unit.



① Screws ② Top cover

Figure 4-405

3) Remove four screws then the scanning mirror motor unit.



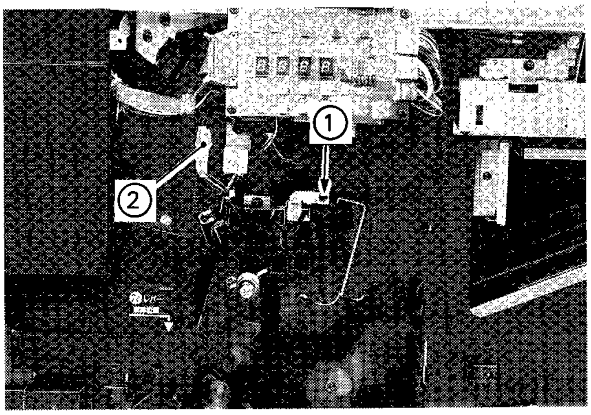
① Screws
② Scanning mirror motor unit

Figure 4-406

> **Notes:**
> 1. Do not remove the dust-proofing cover over the mirror chamber (on the top of the scanning mirror motor unit).
> 2. Be careful not to touch or to allow dust to get on the lens or other optical surfaces.

B. Preconditioning Exposure System

1. Removing the preconditioning exposure lamp.
   1) Remove the photosensitive drum.
   2) Remove the screw and connector, then pull out the preconditioning exposure lamp.



① Screw ② Connector

Figure 4-407

C. Laser Reflection Mirror

1. Adjusting the laser reflection mirror position

The position of the laser reflection mirror should be adjusted whenever the laser/scanning mirror motor unit is replaced or a BD detection error occurs.

1) Insert the actuating tool into the door switch unit.
2) Press the keys as follows to set the SERVICE mode:

$\boxed{*}$ $\boxed{4}$ $\boxed{*}$ $\boxed{*}$ $\boxed{1}$ $\boxed{1}$ $\boxed{0}$ $\boxed{*}$

3) Press keys $\boxed{1}$ $\boxed{*}$ to activate the laser unit.
4) If E100 is displayed on the display PCB, press the top and bottom ends of the laser reflection mirror mount to determine whether the E100 indication goes off.

> **Note:**
> If the E100 indication remains no matter which side of the laser reflection mirror mount is pressed, the problem may not be the fault of the optical path. In this case, do not adjust the laser reflection mirror position.

If the E100 indication goes off, $\boxed{P}$ $\boxed{\ }$ $\boxed{\ }$ $\boxed{1}$ is displayed.

5) If the E100 indication goes off in Step 4, adjust the laser reflection mirror position by doing steps 6 and 7.
6) Loosen the two screws shown in Figure 4-408.
7) Turn the adjustment screw until the E100 indication goes off.

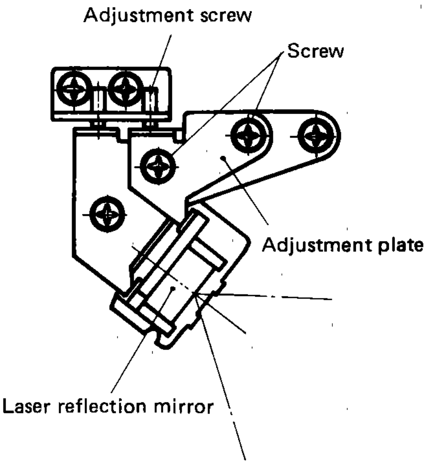


Figure 4-408

8) Turn the adjustment screw counterclockwise to determine the position at which the E100 indication goes on again.
9) Slowly turn the adjustment screw clockwise until the E100 indication goes off again. Turn the adjustment screw clockwise more 30° degrees.
10) Tighten the two screws to fix the adjustment plate.

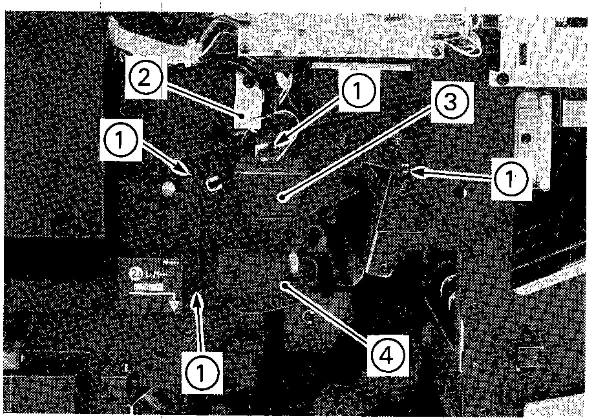
V. ELECTROSTATIC IMAGE FORMATION SYSTEM

A. Photosensitive Drum

1. Disassembly

> Before beginning work, be sure to check that the roller is at its home position.
> If the developing unit faces the drum, the drum may be damaged.

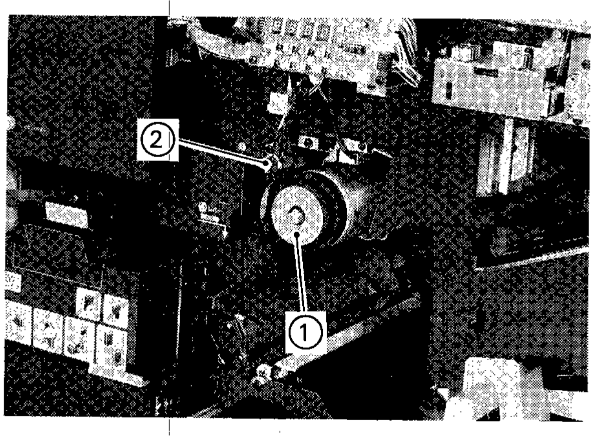
1) Remove the front-middle cover.
2) Remove the transfer drum unit.
3) Remove the drum-cleaning unit.
4) Remove the screw and connector, then take out the primary corona unit.
5) Remove three screws then the drum-centering plate.



① Screw
② Connector
③ Primary corona unit
④ Drum-centering plate

Figure 4-500

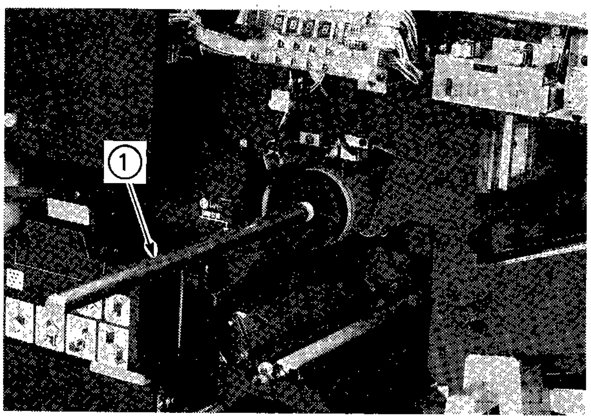
6) Pull out the potential sensor.
7) Remove the drum-fixing ring.



① Ring
② Potential sensor

Figure 4-501

8) Connect the extension shaft to the drum shaft.



① Extension shaft

Figure 4-502

9) Slowly pull out the photosensitive drum.

> **Notes:**
> 1. When pulling out the photosensitive drum, the inside flange of the drum may touch the pin attached on the front of the drum shaft if you are not careful. Avoid the pin by turning the drum and pulling it out carefully.
> 2. Do not lift the extension shaft. If you do, it may disconnect from the drum shaft.
> 3. Because the photosensitve drum is vulnerable to strong light, insensitive or black areas may be caused when the drum is exposed to strong light for a long time. To avoid it, wrap the removed photosensitive drum with a black sheet (if unavailable, use fresh copy paper instead) and store the drum in a dark place.

Remarks:
Even if the photosensitive drum is exposed to room illumination (about 600 lux) for one minutes, the drum can be restored to normal used by placing it in a dark place for twenty four hours. Never expose the photosensitive drum to direct sunlight. Sunlight can have an illumination intensity 1,000 to 30,000 lux.

2. Cleaning

If the surface of the photosensitive drum is dirty, clean it with a flannel cloth sprinkled with toner. (Do not use the lint-free paper.)

> Never dry-wipe the drum or clean it using solvent.
> Also, never use drum-cleaning powder.

B. Corona Units

1. Outline

This copier has seven corona units. All corona wires used for these units are 0.06 mm in diameter.

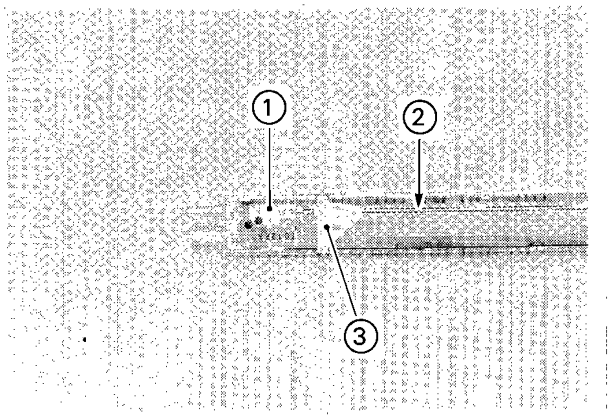
Although the grid wires used in the primary corona unit are 0.1 mm in diameter and not gold plated, standard gold-plated grid wires can be used for field servicing.

2. Removing the primary corona unit wire cleaner

1) Press the keys as follows to set the SERVICE mode:

$\boxed{*}\ \boxed{4}\ \boxed{*}\ \boxed{*}\ \boxed{1}\ \boxed{2}\ \boxed{2}\ \boxed{*}$

2) When keys $\boxed{1}\ \boxed{*}$ are pressed, the wire cleaner moves to the rear of the primary corona unit.
3) Remove the primary corona unit.
4) Remove the screw holding plate.
5) Take out the wire cleaner with the screw.



① Screw holding plate
② Screw
③ Wire cleaner

Figure 4-503

Note:
After attaching the wire cleaner to the primary corona unit, slide the wire cleaner to the rear of the primary corona unit by turning the screw. Next, install the primary corona unit and press the keys as follows to set the SERVICE mode:

$\boxed{*}\ \boxed{4}\ \boxed{*}\ \boxed{*}\ \boxed{1}\ \boxed{2}\ \boxed{3}\ \boxed{*}$

If keys $\boxed{1}\ \boxed{*}$ are pressed, the wire cleaner moves to the front of the primary corona unit.

3. Installing and tensioning corona wires

The basic procedure to install and tension corona wires (not grid wires) is the same for all corona unit. The following procedure for the primary corona wire is representative.

1) Remove the wire cleaner.
2) Remove the front and rear block covers.
3) Unwind about 5 cm of 0.06 mm corona wire, and form a 2 mm loop at the end.

Remarks:
The loop may be formed easily by winding the wire once around a hex key, and then twisting the wire by turning the hex key three or four times.

4) Cut off the excess corona wire at the twisted end.
5) Hook the loop onto the stud.

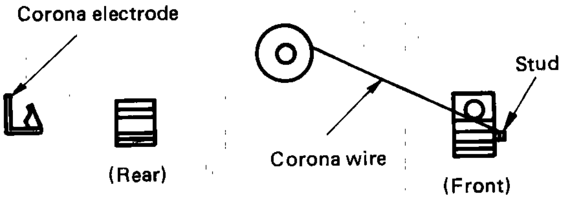


Figure 4-504

6) Place the corona wire into the V-groove of the corona wire positioner at the rear of the corona unit, hook the corona wire tensioning spring on the corona wire, and twist the spring.

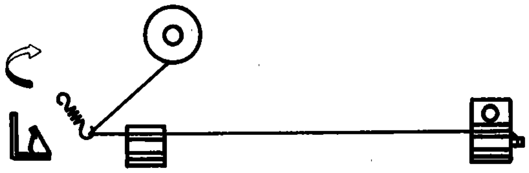


Figure 4-505

7) Cut off the excess corona wire.
8) Grasp the end of the corona wire tensioning spring with tweezers, and hook it onto the corona electrode.

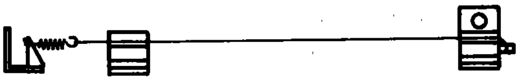


Figure 4-506

Note:
Check the following.

- The corona wires must be free of kinks, bends, and peeling plating.
- The corona wire should be in the V-groove of the wire positioner.

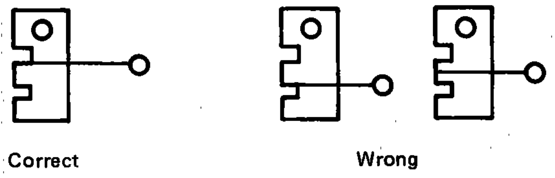


Figure 4-507

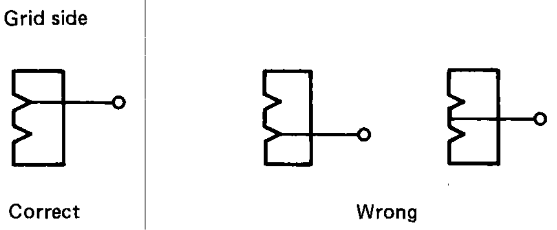
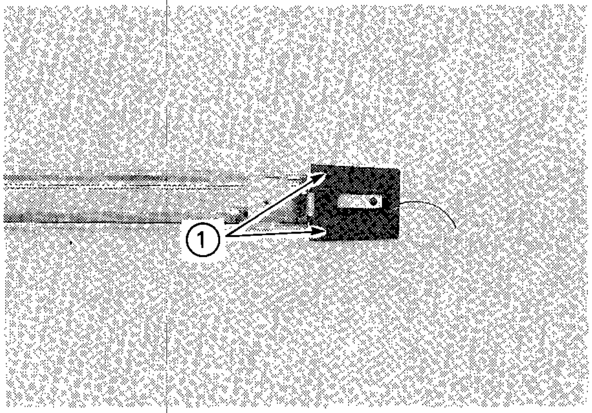


Figure 4-508 Primary corona wire

9) Attach the cover to the front and rear blocks.
10) Wipe the primary corona wire with lint-free paper moistened with alcohol.
11) Attach the wire cleaner.

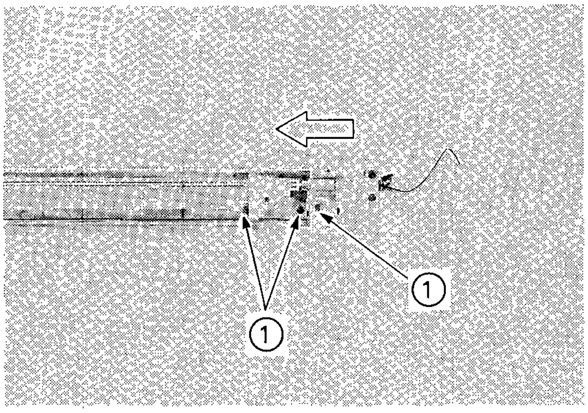
4. Stringing the primary corona grid wire
1) Remove the two screws and take off the front knob.



① Screws

Figure 4-509

2) Remove the rear block cover.
3) Loosen the three screws securing the front block, slide the front block as shown in Figure 4-510, and fasten the screws temporarily.



① Screws

Figure 4-510

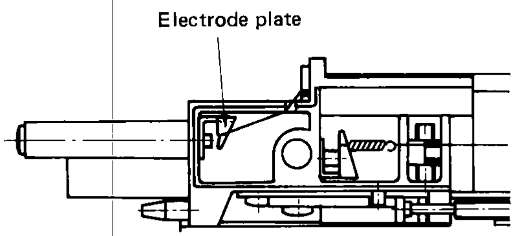
4) Unwind about 5 cm of 0.08 mm corona wire (FY1-0581-000), and form a 2 mm loop at the end.

Remarks:
The loop can be formed as described earlier.

5) Cut off the excess wire at the twisted end leaving 1 mm or less.
6) Hook the loop onto the electrode plate and string the wire in the order shown in Figure 4-511.
7) After 29 wires have been strung, hook the end of the corona wire onto the stud and wind it around the screw for fixing.
8) Cut off the excess corona wire leaving 1 mm or less.
9) Again loosen the screws fastened temporarily in Step 3, and tighten the grid wire by sliding the front block in the direction opposite to that shown in Figure 4-510. Dry-wipe the grid wires.
10) Check the following.

- The grid wires must be free of kinks, bends, and peeling plating.
- The wires should be spaced uniformly. (The wires should be in the grooves in the block.)

11) Attach the rear block cover and knob.



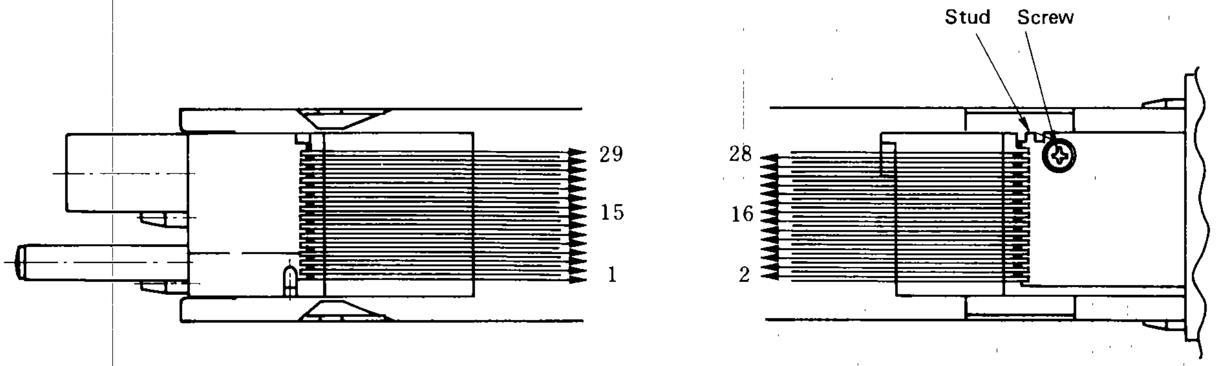


Figure 4-511

5. Adjusting the height of the corona wire

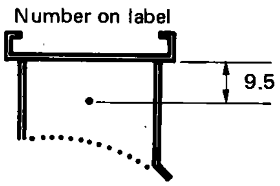
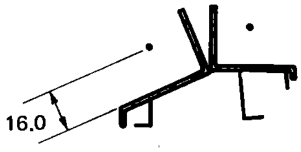
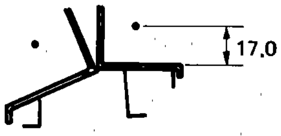
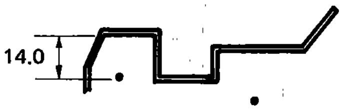
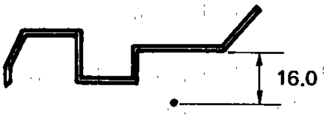
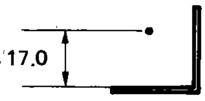
Corona	Corona wire height (mm)	Adjust-ment range
Primary corona		±2
Transfer corona		±1
Inner static charge eliminating corona		+0 −2
Outer static charge eliminating corona		±2
Separation corona		±1
Pre-fixing corona		+0 −1

Figure 4-512

Remarks:
The height of each corona wire can be adjusted by turning the screw at the rear of the corona unit. One turn of the screw changes the wire height approximately 0.7 mm.

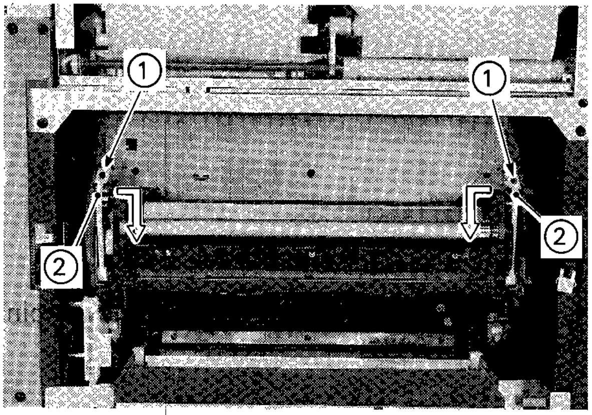
VI. DEVELOPING SYSTEM

A. Developing Assembly

The structure and installation procedure given below is the same for all developing units in the copier.

1. Removing a developing unit

1) Turn the turret and select the developing unit to be removed.
2) Remove two screws.
3) While slightly pressing the developing unit, remove the ass'y by slightly swinging the developing unit positioning lever backward.

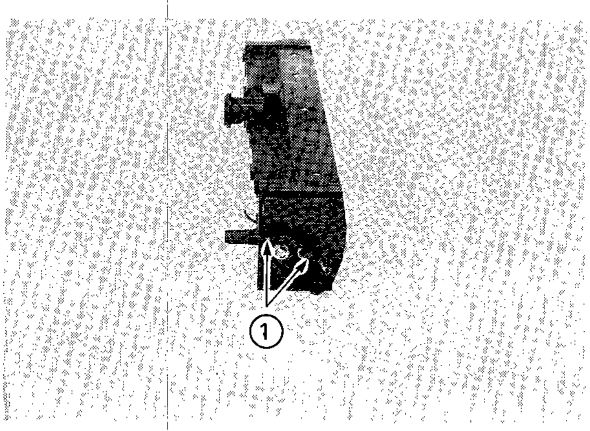


① Screw
② Positioning lever

Figure 4-600

4) Be careful not to spill the toner when removing the developing unit. Note the following.

(1) Be careful not to touch or allow the toner to get on the fiber optic lens array when removing the developing unit.



① Fiber optic lens array

Figure 4-601

5) Attach tape to the toner supply outlets of the developing unit.

(1) When turning the developing unit, turn it only in the direction as shown in Figure 4-602. If the unit is turned in the other direction, the toner spills from the toner supply outlet.

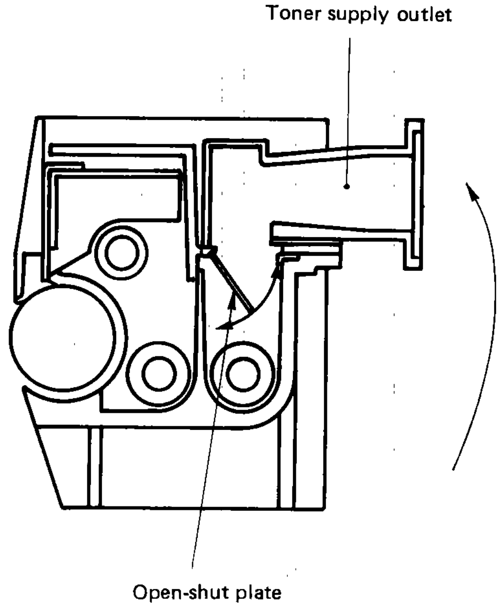
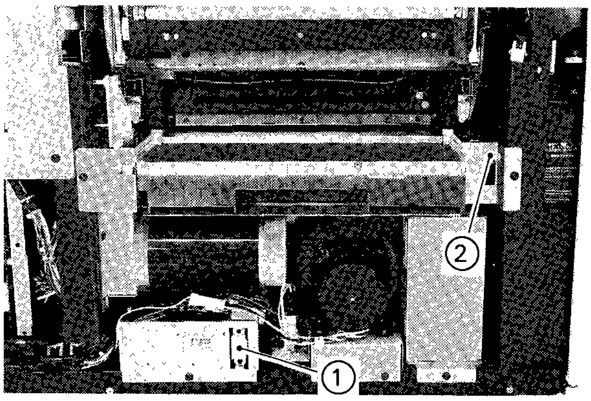


Figure 4-602

2. Replacing start developer

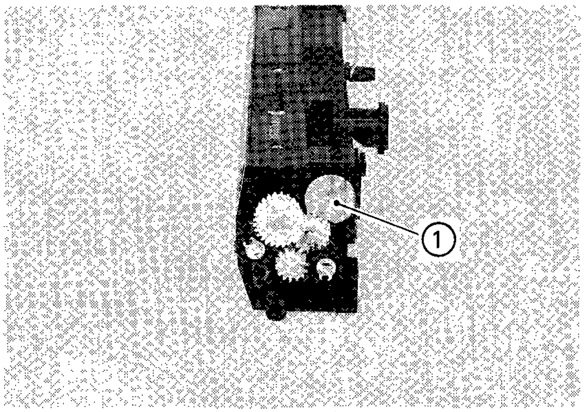
1) Turn the turret by hand so that the developing unit to be emptied of is at the bottom.
2) Select the SERVICE mode. ($\boxed{*}$ $\boxed{4}$ $\boxed{*}$)
3) Select address P142 ($\boxed{*}$ $\boxed{1}$ $\boxed{4}$ $\boxed{2}$ $\boxed{*}$) and press keys $\boxed{1}$ $\boxed{*}$.
4) Press SW5, located under the turret.
   Check that the developing cylinder of the developing unit in question is rotating.
5) Push down the toner catcher lever.
   The toner in the developing unit is collected.



① SW5
② Toner catcher lever

Figure 4-603

6) When most of the toner in the developing unit has been removed, return the toner catcher lever to its original position.
7) Turn SW5 off.
8) Gently remove the developing unit without tilting it.
9) Remove the cap from the developing unit while holding the developing unit horizontal.

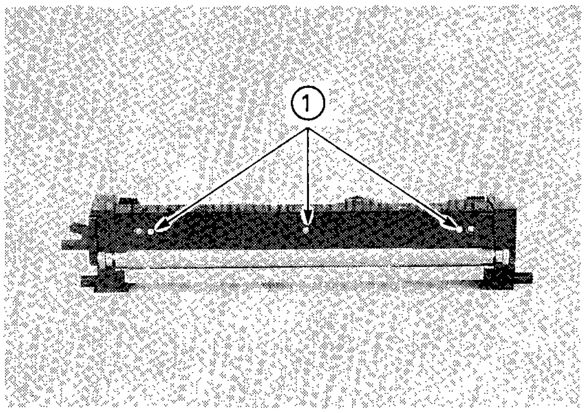


① Cap

Figure 4-604

10) Stand the developing unit upright and remove the remaining toner.
11) Attach the cap to the developing unit.
12) Install the developing unit in the copier.
13) Turn the turret by hand to position the developing unit at the bottom again.
14) Turn SW5 on.
15) Push down the toner catcher lever.
16) When all toner in the developing unit has been removed, return the toner catcher lever to its original position.
17) Press the $\boxed{c}$ key twice.
18) Remove the developing unit from the copier.
19) Put new start developer in the developing unit.

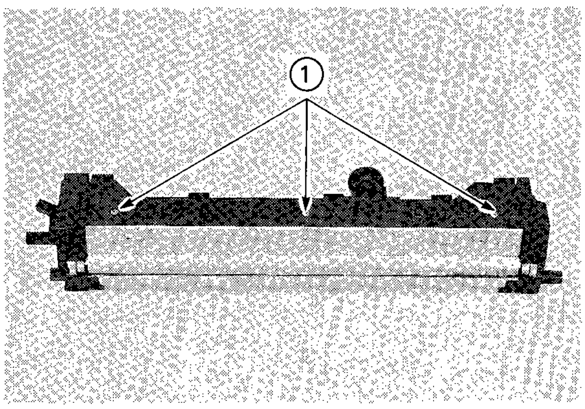
3. Removing the developing cylinder and side seals
1) Remove toner from the developing unit.
2) Take out the developing unit.
3) Remove three screws then the blade cover.



① Screws

Figure 4-605

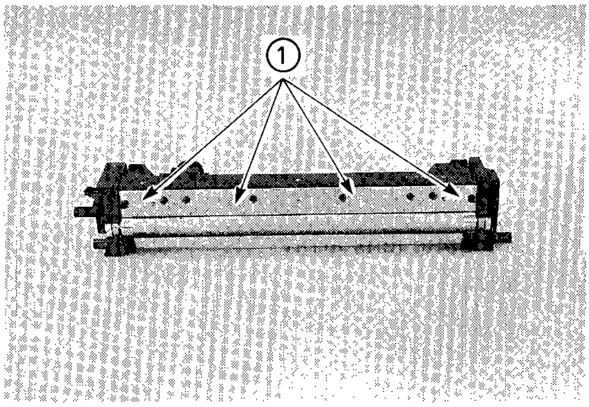
4) Remove three screws then the developing unit top cover.



① Screws

Figure 4-606

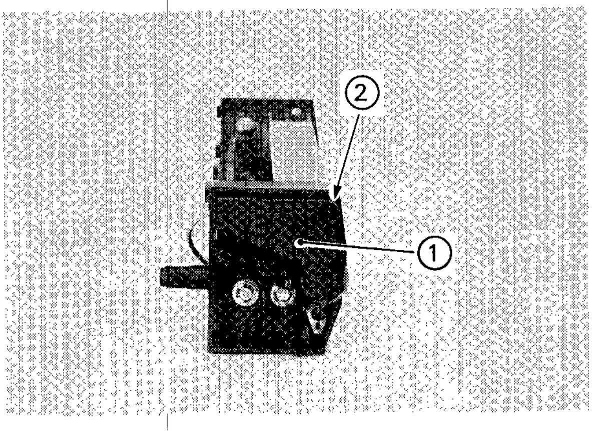
5) Remove four screws then the blade.



① Screws

Figure 4-607

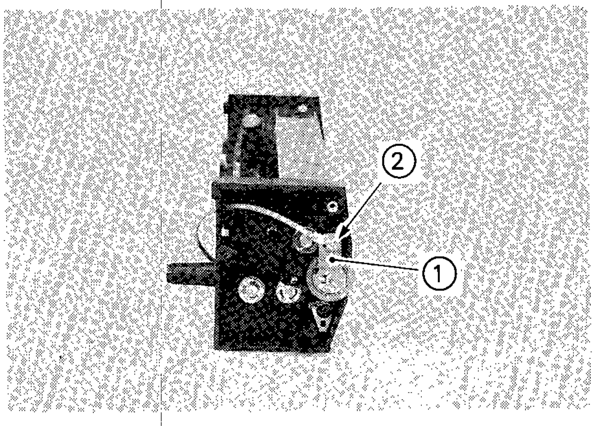
6) Remove the screw then the gear cover.



① Gear cover ② Screw

Figure 4-608

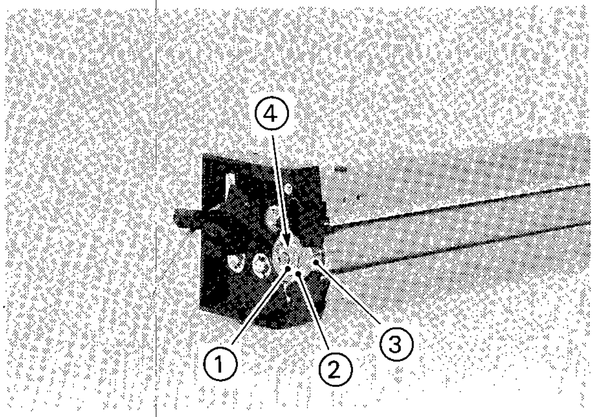
7) Mark the magnet positioning plate position, remove the screw, then remove the magnet positioning plate.



① Magnet positioning plate
② Screw

Figure 4-609

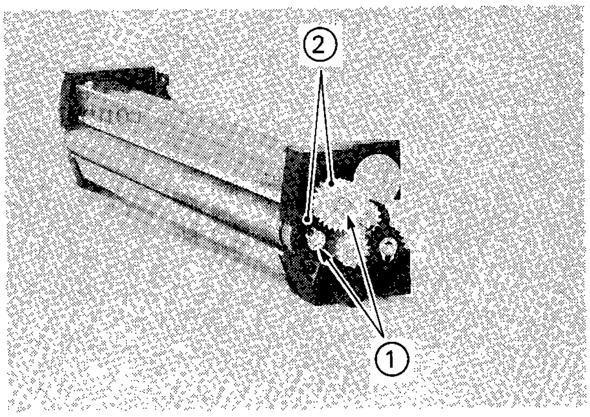
8) Remove the grip ring, washer, developing roller and ball bearing.



① Grip ring ③ Ball bearing
② Developing roller ④ Washer

Figure 4-610

9) Remove two grip rings, two gears, one developing roller, and one ball bearing.



① Grip rings ② Gears

Figure 4-611

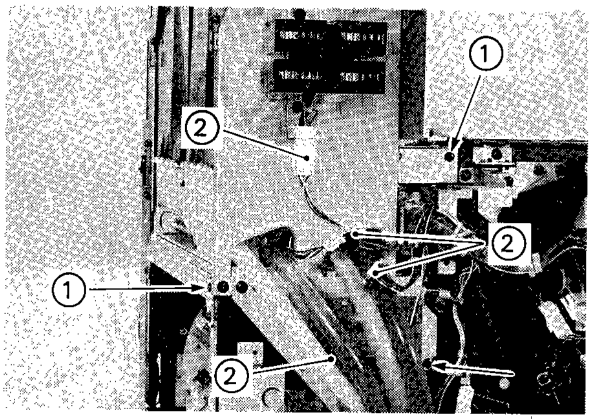
10) Remove the developing cylinder.
11) Remove the seal mount.
12) Remove the side covers.
13) Remove the side seals.

4. Installing the developing cylinder
Install the developing cylinder by reversing the removal procedure.
Note the following.

Note:
1. Install the developing cylinder so that the part with the longer shaft is facing toward the rear of the developing unit.
2. Protect the surface of the developing cylinder from oil and fingerprints. If any are found, wipe them off with dry lint-free paper. If the wiped-off area produces faint images, wipe the area with lint-free paper dampened with water. Do not use any solvent.

B. Hopper Unit

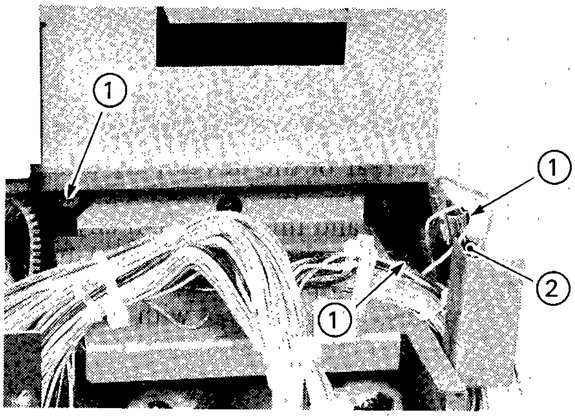
1. Removing the hopper
   1) Remove the front and rear covers of the hopper and remove the front left door of the copier.
   2) Slide the printer top cover to the right.
   3) Remove three screws and four connectors.



① Screws ② Connectors

Figure 4-615

   4) Remove the screw then the left panel switch mount.
   5) Remove two screws.



① Screws
② Left panel switch mount

Figure 4-616

   5) Pull the hopper ass'y forward and remove it.

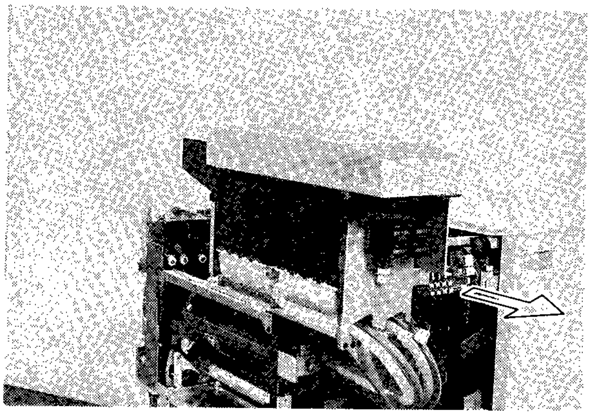
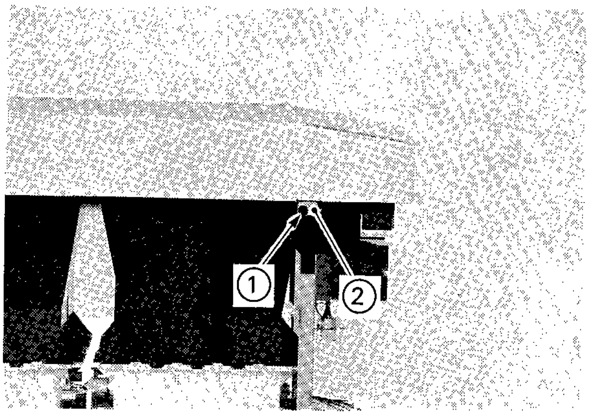


Figure 4-617

2. Removing a color toner hopper unit

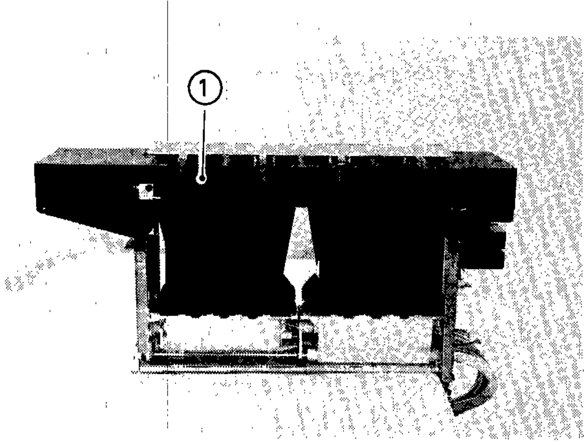
   The procedure to remove any color toner hopper is the same. The procedure to remove an M hopper unit is explained below. (This should be done in a workshop.)
   1) Remove the hopper from the copier.
   2) Remove the right cover of the hopper.
   3) Remove one screw, one hinge, then the upper door of the hopper.



① Screw ② Hinge

Figure 4-618

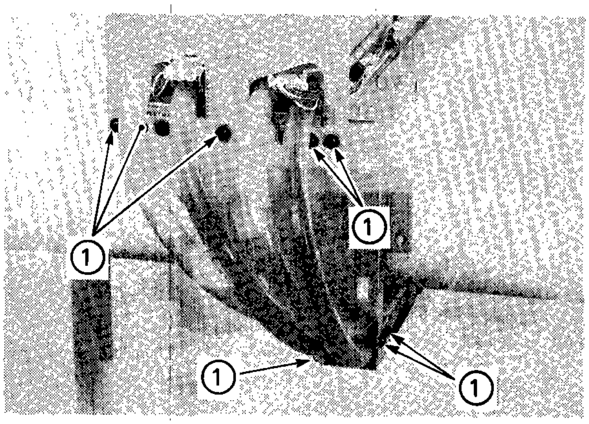
4) Remove 11 screws then the hopper top cover.



① Top cover

Figure 4-619

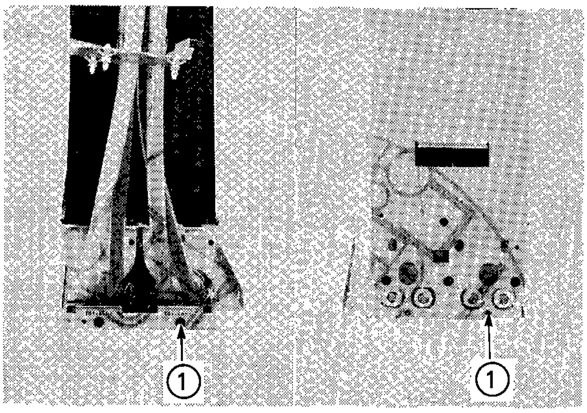
5) Put a wad paper into the toner supply outlet of the developing unit to prevent toner from falling out.
6) Remove eight screws then the hopper front cover.



① Screws

Figure 4-620

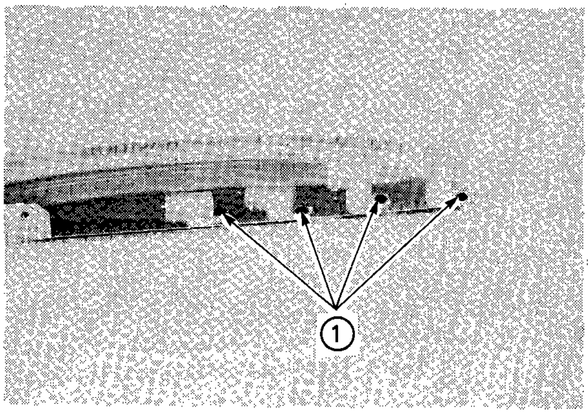
7) Remove two screws and slide the M and BK hopper units to the right.



① Screws

Figure 4-621

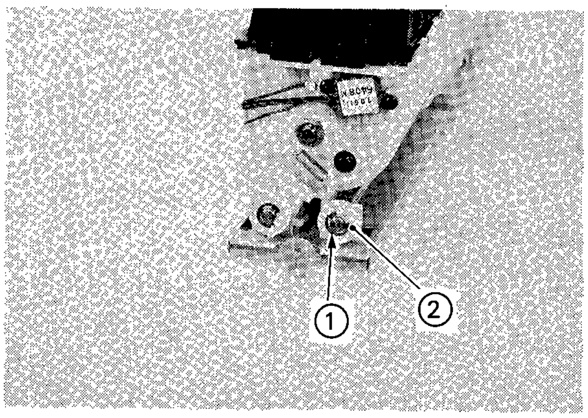
8) Remove one screw.



① Screws

Figure 4-622

9) Remove the two screws securing the M hopper unit from under the bottom plate.
10) Remove the E ring, coupling, and bushing, then remove the M hopper unit.



① E ring ② Coupling

Figure 4-623

C. Turret Assembly

1. Construction

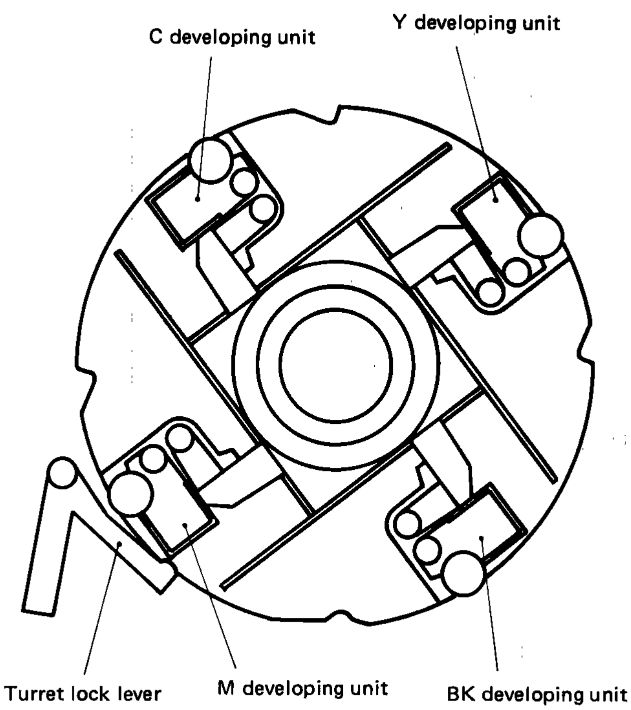
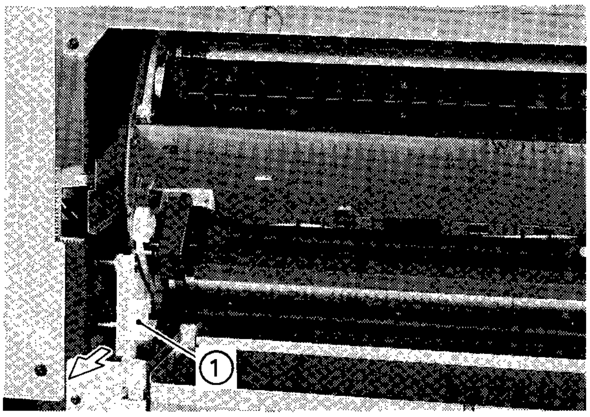

C developing unit
Y developing unit
Turret lock lever
M developing unit
BK developing unit

Figure 4-624 Roller home position

2. Turret rotation procedure

Pull the turret lock lever, then turn the roller while pressing it down.

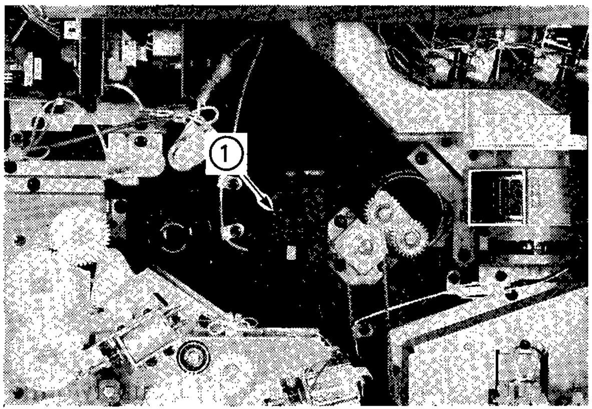


① Turret lock lever

Figure 4-625

3. Removing the roller unit

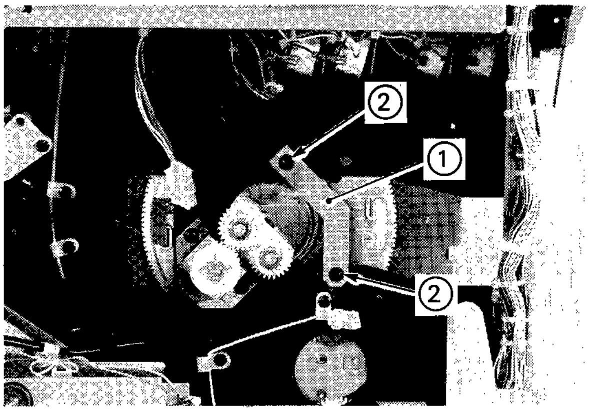
1) Remove the photosensitive drum.
2) Remove the hopper unit.
3) Remove toner dust collecting motor 1.
4) Remove the turret lock release unit.
5) Remove the drum motor.
6) Remove the mounting screw then the developing bias unit.



① Screw

Figure 4-626

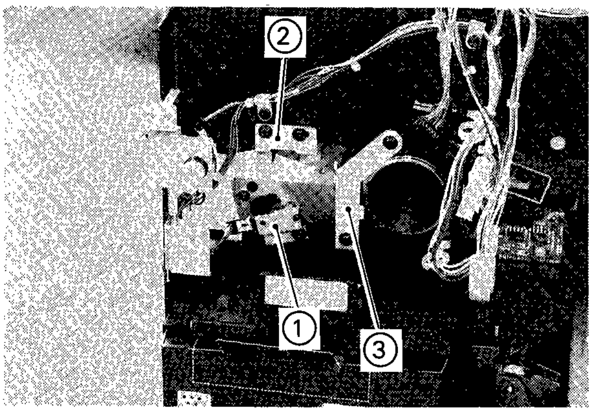
7) Remove all developing units.
8) Remove the toner catcher unit.
9) Remove two mounting screws then the turret positioning plate.



① Turret positioning plate
② Screws

Figure 4-627

10) Remove the turret home position sensor.
11) Remove the brush unit.
12) Remove two mounting screws then the turret positioning plate.



① Turret home position sensor
② Brush unit
③ Turret positioning plate

Figure 4-628

13) Gently remove the turret ass'y.

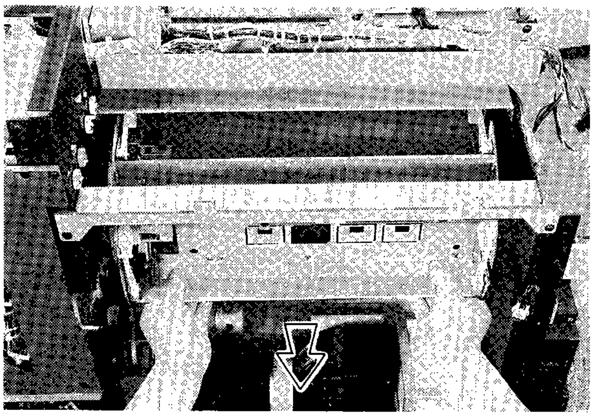
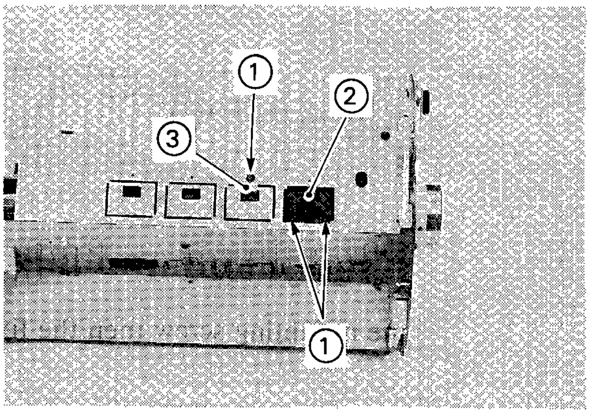


Figure 4-629

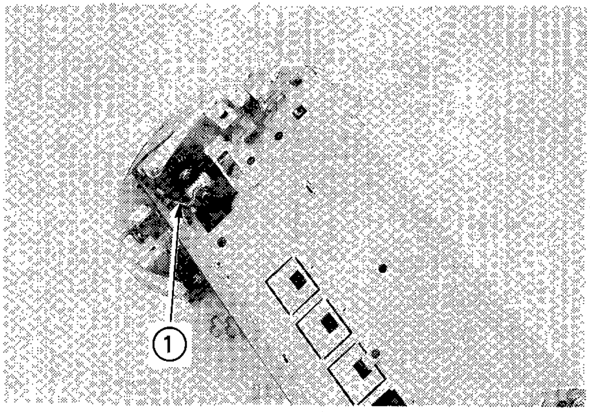
4. Removing the turret shaft
1) Remove the turret unit from the copier.
2) Remove two mounting screws then the toner supply outlet.
   After removing the toner supply outlet, shut the outlet with gummed cloth tape or similar. Remove and shut all toner supply outlets in this way.
3) Remove one mounting screw then the locking plate.



① Screws
② Toner supply outlet
③ Locking plate

Figure 4-630

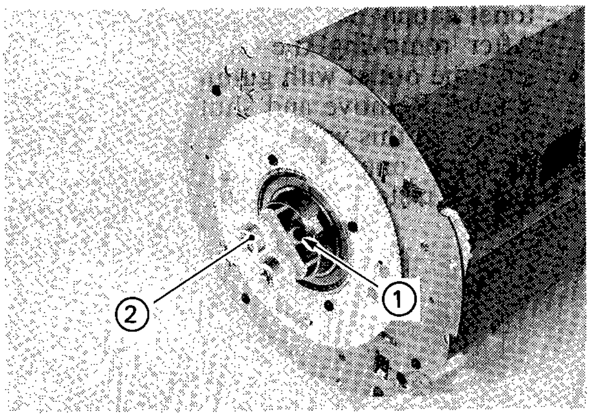
4) Remove the spring.
   Remove the springs for all four colors.



① Spring

Figure 4-631

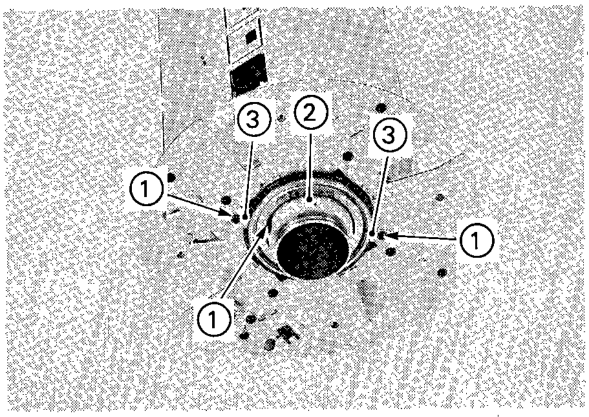
5) Remove one mounting screw then the gear unit.



① Screw ② Gear unit

Figure 4-632

6) Remove one mounting screw then the fixing ring.
7) Remove two mounting screws then the two ball bearing retainers plates.



① Screws
② Fixing ring
③ Ball bearing retainers

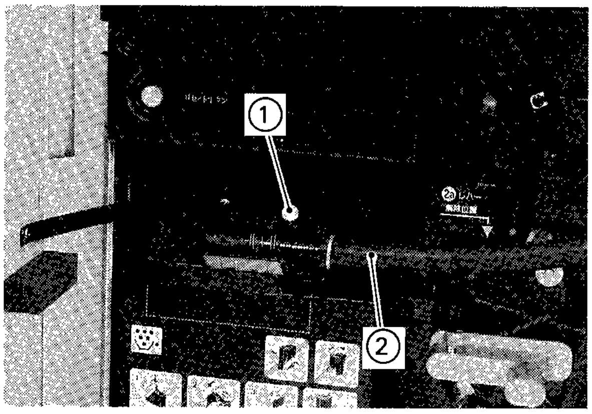
Figure 4-633

8) Remove the ball bearing.
9) Remove the roller shaft.

VII. DRUM CLEANING SYSTEM

A. Drum-Cleaning Unit

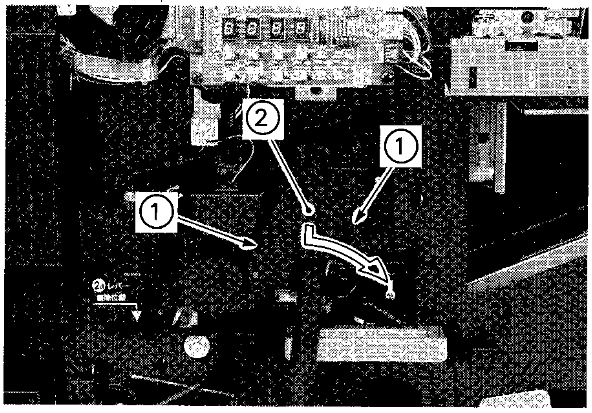
1. Removing the drum cleaning unit
   1) Remove the knurled screw then the hose.



① Knurled screw ② Hose

Figure 4-700

   2) Remove two mounting screws, then pull the drum cleaning unit handle forward.
   3) Move the drum cleaning unit handle as shown in Figure 4-701.



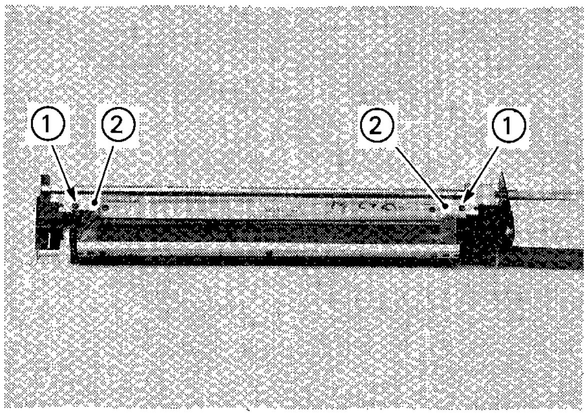
① Screws
② Drum cleaning unit handle

Figure 4-701

   4) Grasp the cleaner handle and pull the drum cleaning unit forward.

Note:
Because there is no drum cleaning assembly stop, be careful not to pull the cleaning unit so far that it falls out.

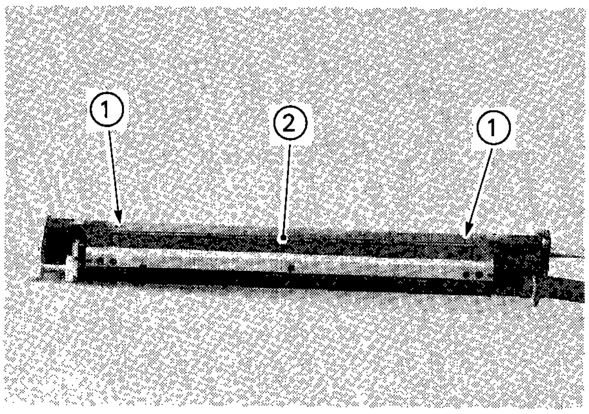
2. Removing the cleaning blade
   1) Remove the drum-cleaning unit from the copier.
   2) Remove two mounting screws then the two brushes.



① Screws ② Brushes

Figure 4-702

   3) Remove two mounting screws then the cleaning blade.

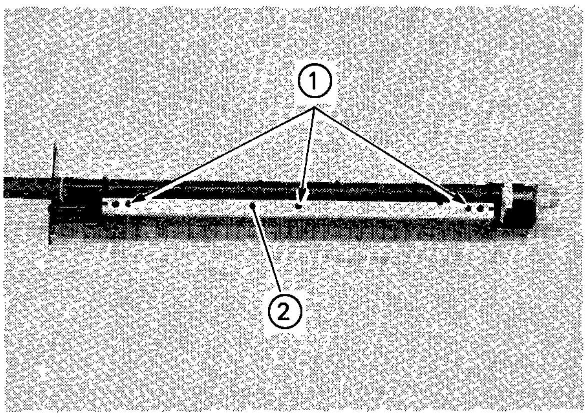


① Screws ② Cleaning blade

Figure 4-703

Check:
Before installing the drum-cleaning unit, always apply toner to the edge of the blade liberally when a new blade is installed.

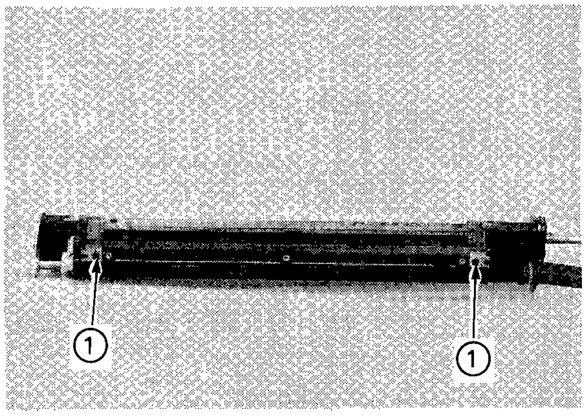
3. Removing the sweeper sheet and side seals
1) Remove the drum-cleaning unit from the copier.
2) Remove three mounting screws then the sweeper sheet.



① Screws ② Sweeper sheets

Figure 4-704

3) Remove two mounting screws then the side seals.



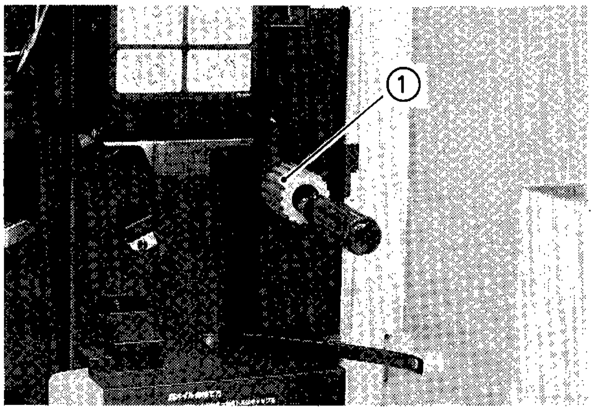
① Screws

Figure 4-705

VIII. FIXING SYSTEM

A. Fixing Unit

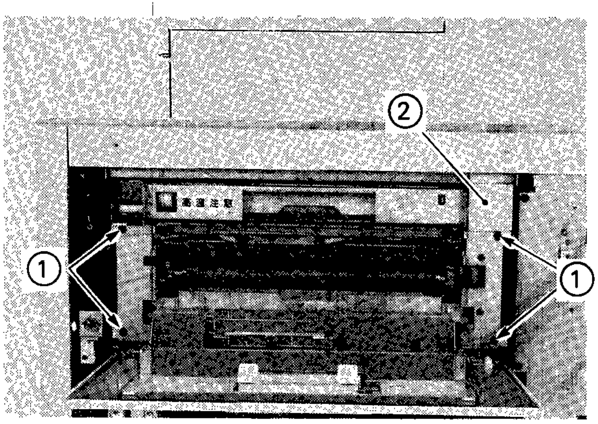
1. Removing the fixing unit
 1) Remove the screw then the knob.



① Handle

Figure 4-800

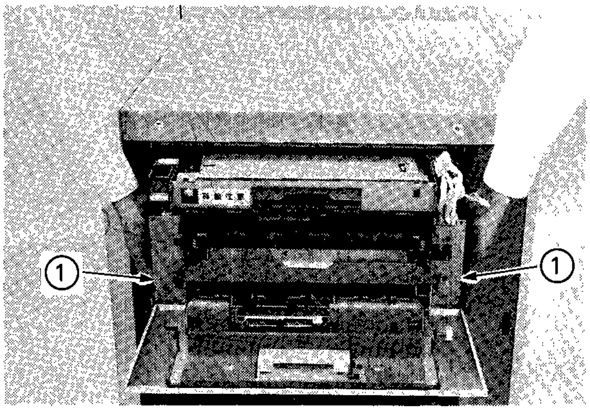
2) Open the paper delivery unit cover.
3) Remove four mounting screws then the connector cover.
4) Disconnect three connectors.



① Screws ② Connector cover

Figure 4-801

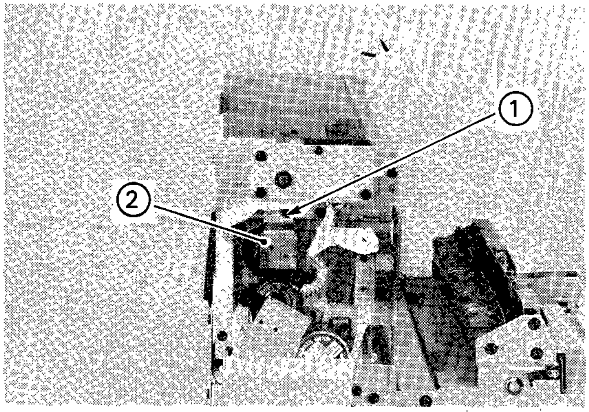
5) Pull out the fixing unit, holding it by the handles, and remove it.



① Handles

Figure 4-802

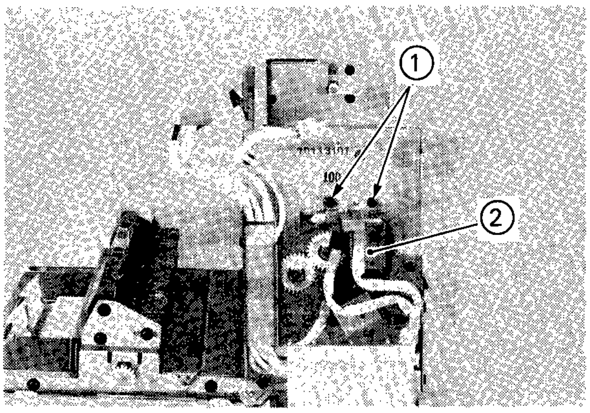
2. Removing the upper fixing heater/roller
 1) Remove the fixing unit from the copier.
 2) Remove the upper cleaning belt unit.
 3) Remove the mounting screw then the heater on the front mounting plate.



① Screw
② Front mounting plate

Figure 4-803

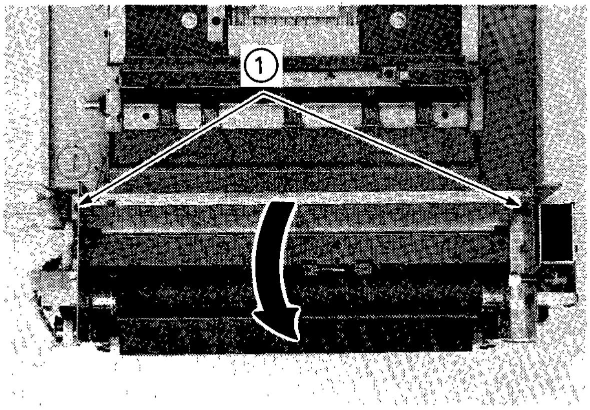
4) Remove two screws then the rear mounting plate.



① Screws
② Rear mounting plate

Figure 4-804

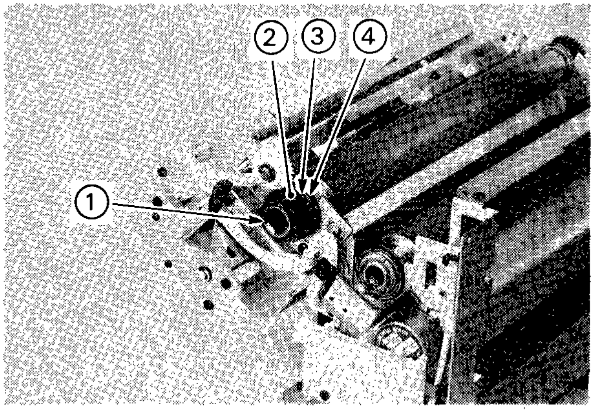
5) Remove two mounting screws, then open the upper part of the fixing ass'y.



① Screws

Figure 4-805

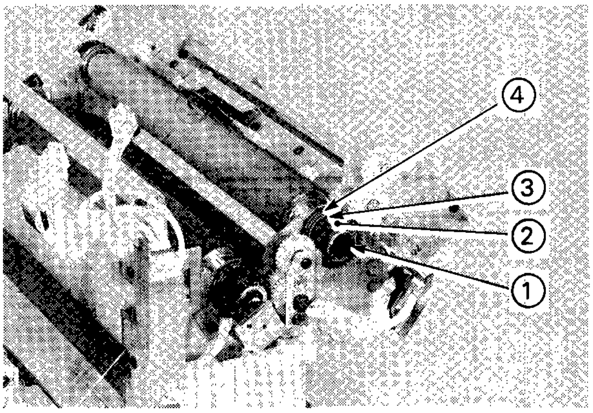
6) Remove the C ring then the gear, ball bearing, and the heat insulation bushing (front side).



① C ring
② Gear
③ Ball bearing
④ Heat insulation bushing

Figure 4-806

7) Remove the C ring then the gear, ball bearing, and the heat insulation brushing (rear side).



① C ring
② Gear
③ Ball bearing
④ Heat insulation bushing

Figure 4-807

8) Remove the upper roller.

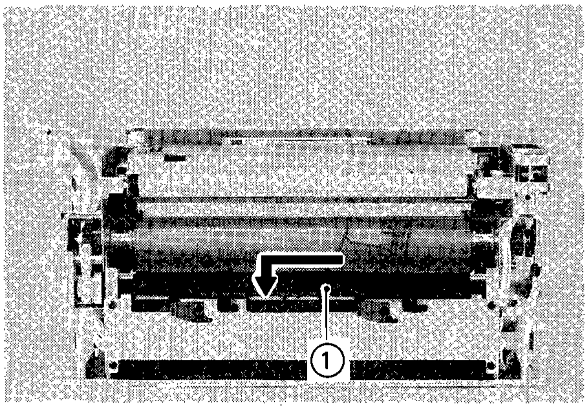
3. Installing the upper fixing heater/roller

Installing the upper fixing heater and upper roller is the reverse of removal. Note the following.

- Handling the upper fixing heater
  Do not touch the surface of the upper fixing heater with your hand.
- Handling the upper fixing roller
  To prevent the surface of the upper fixing roller from being soiled or scratched, the roller should be wrapped in copy paper.
  The upper fixing heater and roller can be installed in either direction.

4. Removing the lower fixing heater/roller

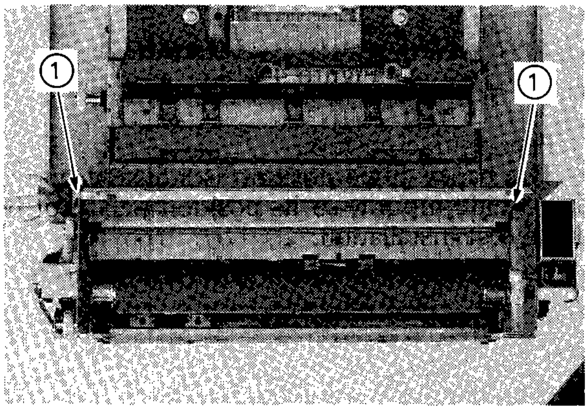
1) Remove the fixing unit from the copier.
2) Remove the paper guide plate.



① Paper guide plate

Figure 4-808

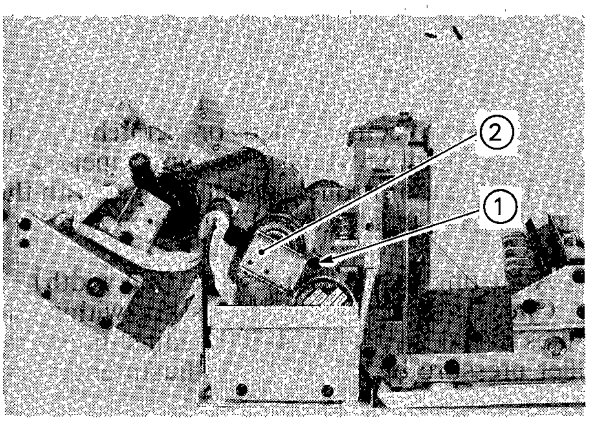
3) Remove the upper cleaning belt unit.
4) Remove two mounting screws, then open the upper part of the fixing unit.



① Screws

Figure 4-809

5) Remove the mounting screw then the heater terminal mounting plate and lower fixing heater.



① Screw
② Heater terminal mounting plate

Figure 4-810

6) Lift the lower fixing roller from the fixing unit.

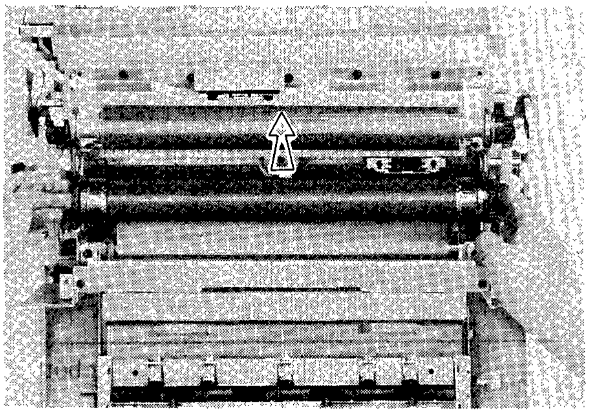
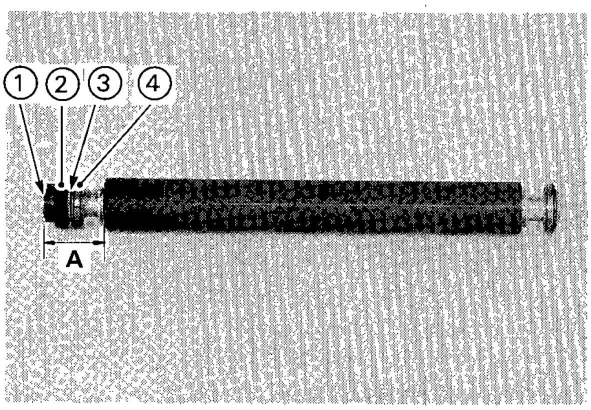


Figure 4-811

7) Remove the C ring from both ends of the roller, then remove the gear, ball bearing, and heat insulation bushing.



① C ring
② Gear
③ Ball bearing
④ Heat insulation bushing

Figure 4-812

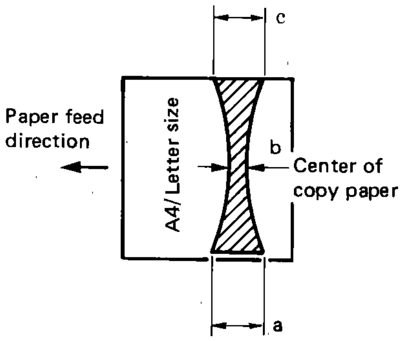
5. Installing the lower fixing heater/roller

Installing the lower fixing heater and roller is the reverse of removal. Note the following.

- Handling the lower fixing heater
  Do not touch the surface of the heater with your hand.
- Handling the lower fixing roller
  To prevent the surface of the lower fixing roller from being soiled or scratched, the roller should be wrapped in copy paper.
  Install the lower roller so that the part with the longer A is inside. (See Figure 4-812)

6. Adjusting the roller pressure (nip width)

Check the nip width. If it is not within the values listed in Table 4-800, adjustment the roller pressure by turning the adjustment bolts.



Note:
Values a and c are used when adjusting the nip width at the positions 10 mm from both ends of the copy paper.

Figure 4-813

Dimensions	Measure nip width only after both rollers have heated up
b	$5.5^{+1.0}_{-0.5}$ (mm)
$\lvert a-c \rvert$	0.5 mm or less
$\lvert a-b \rvert$ $\lvert c-b \rvert$	1 mm or less

Table 4-800

- Measuring the nip width
  If the roller is cool when starting the measurement, switch copier ON, leave it for 15 minutes, make 20 copies, then measure the nip width.

Measuring procedure

1) Insert the A4/letter cassette into the upper cassette slot.
2) Press the following keys to select the SERVICE mode:

$\boxed{*}\ \boxed{4}\ \boxed{*}\ \boxed{*}\ \boxed{2}\ \boxed{1}\ \boxed{0}\ \boxed{*}$

3) Press keys $\boxed{1}\,\boxed{*}$.
   The copy paper is fed from the upper cassette and stops while it is still in the fixing unit, then is delivered.
4) Measure the width of the shiny part of the image made on the copy paper. (See Figure 4-813.)

7. Thermistor position

Check that the sensing surface of the thermistor makes uniform contact with the surface of the roller.

Remarks:
The thermistor position need not be adjusted. If the sensing surface of the thermistor does not contact the roller surface uniformly, check whether the mounting spring is deformed.

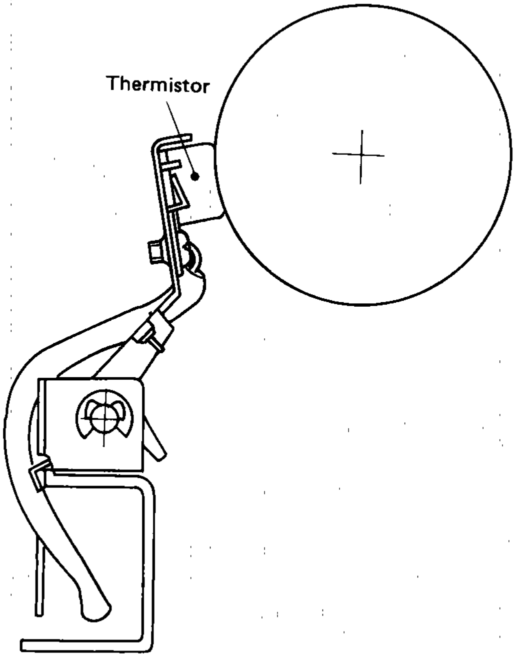


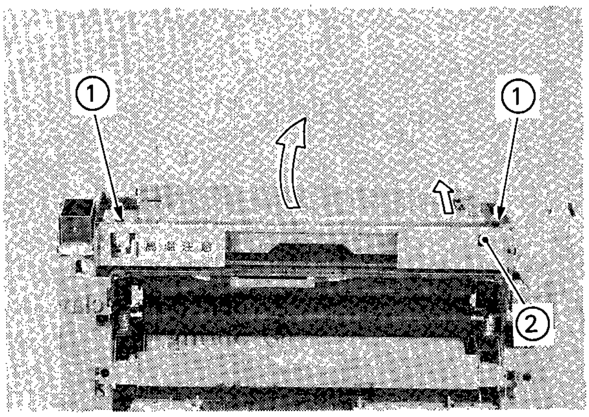
Figure 4-814

8. Paper guide position

The paper guide position is adjusted by the paper guide mount, so its position need not be adjusted at installation.

B. Fixing Unit Cleaning Unit

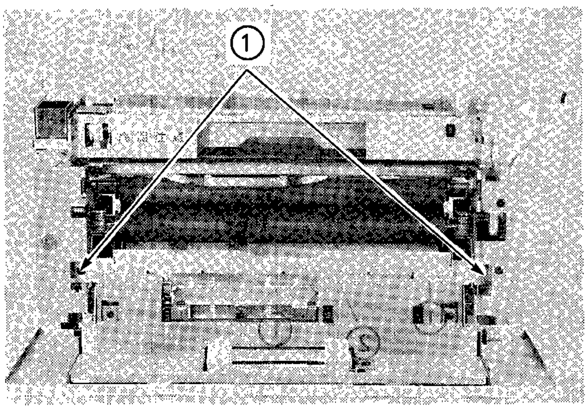
1. Removing the upper cleaning belt unit
   1) Remove the fixing unit from the copier.
   2) Remove two mounting screws.
   3) While pushing the layer as shown, set the upper cleaning belt unit upright as shown, and remove it.



① Screws ② Layer

Figure 4-815

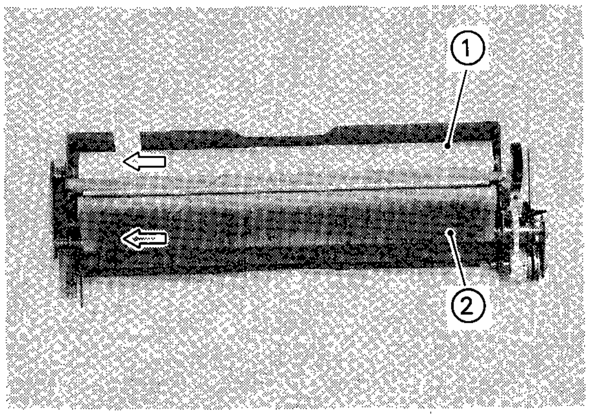
2. Removing the lower cleaning belt unit
   1) Remove the fixing unit from the copier.
   2) Remove two screws, then remove the lower cleaning belt unit.



① Screws

Figure 4-816

3. Removing the belt
   1) Push the supply shaft toward the back of the fixing unit, and remove the shaft.
   2) Push the take-up reel toward the back of the fixing unit and remove the reel.



① Supply shaft ② Take-up reel

Figure 4-817

4. Mounting the belt unit

The belt service unit consists of a supply shaft, take-up reel, and a belt. The belt can be mounted by reversing the removal procedure. Note the following.

- First wind the belt around the take-up reel until the red line completely disappears, then mount the belt unit. Make sure that part of the belt contacting the roller is impregnated with oil.

Check:
Make sure that the belt winds straight, is taut, and is free of wrinkles.

5. Belt drive solenoid position

Install the solenoid so that the stroke shown in Figure 4-819 is caused when the plunger of the solenoid is pressed in by hand.

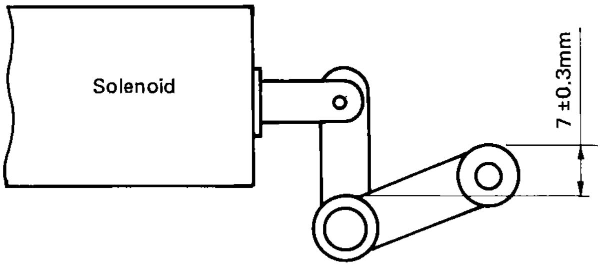
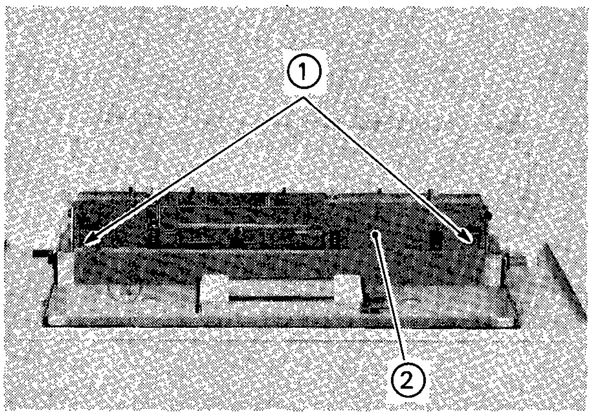


Figure 4-819

C. Delivery Assembly

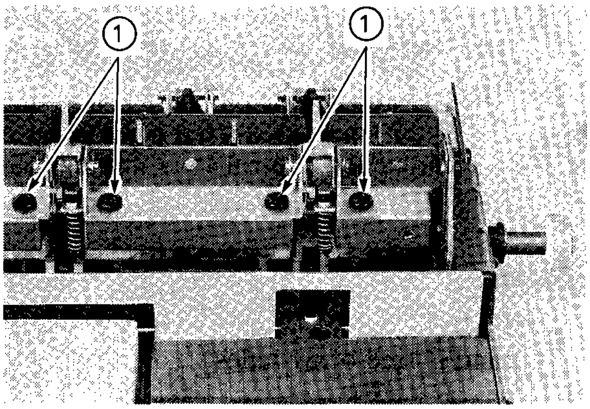
1. Removing the upper roller separation claw
   1) Open the delivery unit.
   2) Remove two screws then the inner cover of the delivery unit.



① Screws ② Inner cover

Figure 4-820

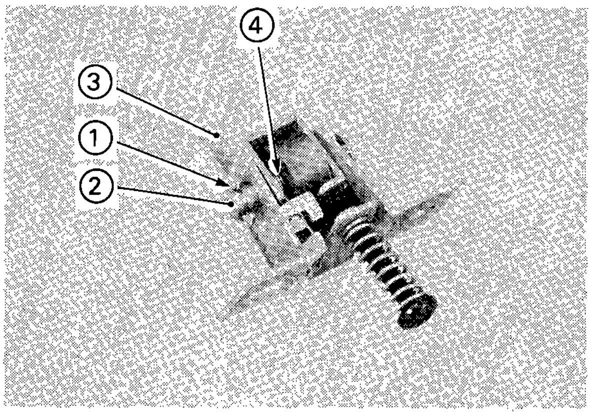
   3) Remove two screws then the upper roller separation claw unit.



① Screws

Figure 4-821

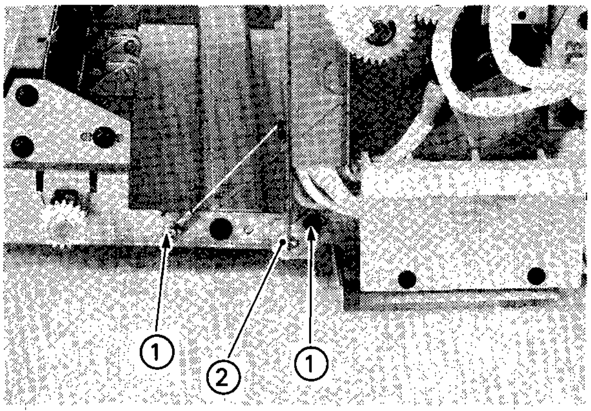
   4) Remove the E ring then the shaft, spring, and separation claw.



① E ring ③ Separation claw
② Shaft ④ Spring

Figure 4-822

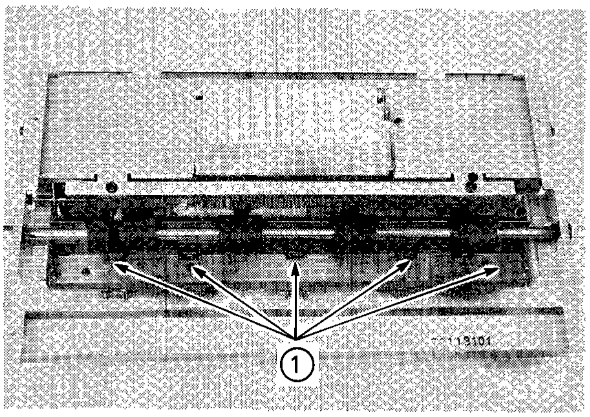
2. Removing the lower roller separation claw
   1) Remove the fixing unit
   2) Remove the delivery unit cover.
   3) Remove the mounting screw. (See Figure 4-823.)
   4) Remove the mounting screw and positioning plate then the delivery unit.



① Screws ② Positioning plate

Figure 4-823

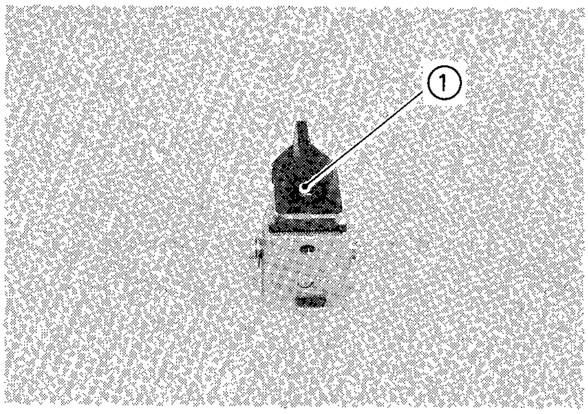
5) Remove the mounting screw then the lower fixing roller separation claw unit.



① Screws

Figure 4-824

6) Remove the mounting screw then the separation claw.



① Screw

Figure 4-825

3. Adjusting the upper separation claw position
   1) Remove the upper belt unit from the fixing unit.
   2) Insert a feeler guage (1±0.5 mm) between the upper separation claw and the upper fixing roller.
   3) Adjust the above gap to 1±0.5 mm by turning the adjustment screw.

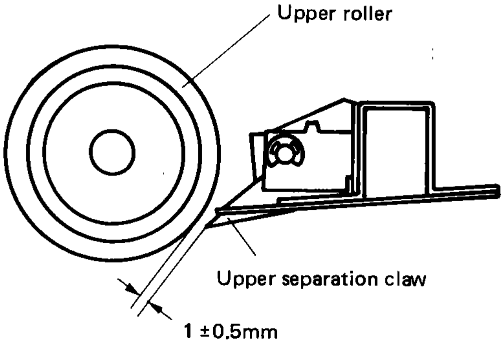
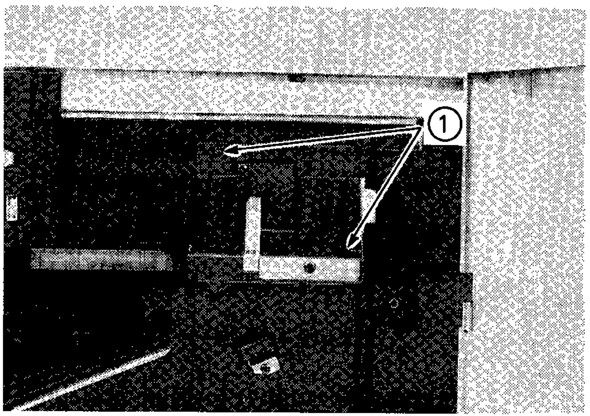


Figure 4-826

D. Oil Applying Roller Unit

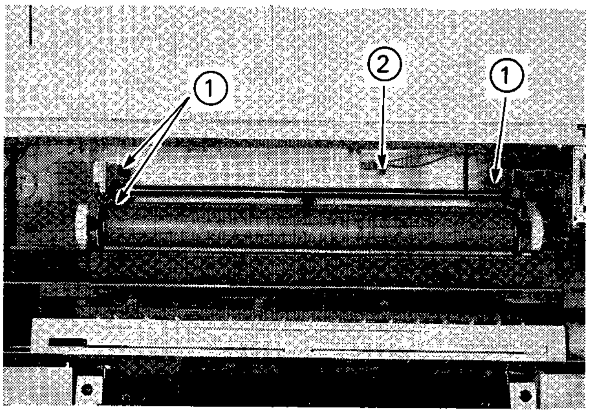
1. Removing the oil applying roller unit
   1) Remove the fixing unit.
   2) Remove the silicone oil bottle from the bottle mount.
   3) Remove two screws then the bottle mount. When removing the bottle mount, also unplug the connector of the remaining oil level sensor PCB. The oil drips, so care should be taken.



① Screws

Figure 4-827

   4) Remove the oil.
   5) Remove three screws then the connector.



① Screws ② Connector

Figure 4-828

6) Gently pull the oil applying roller unit forward.

Note:
While pulling the unit forward, be careful not to tilt it so that the oil spills.

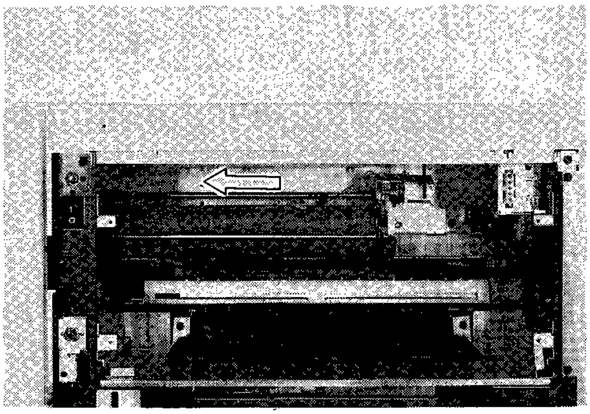
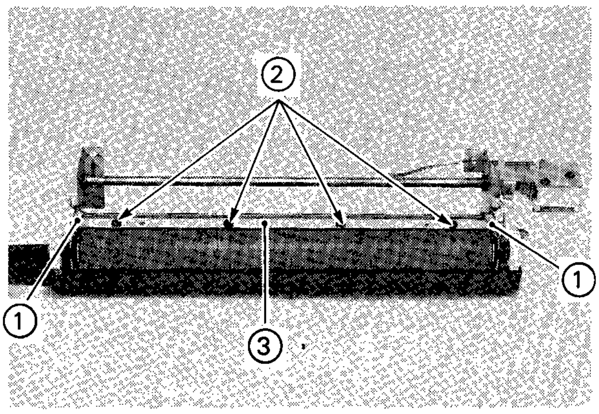


Figure 4-829

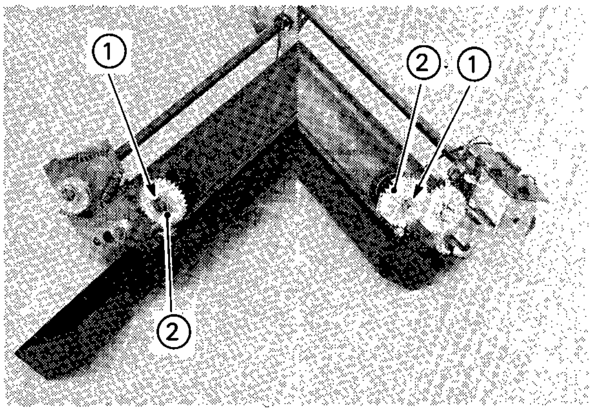
2. Removing the oil applying roller and blade
1) Remove the oil applying roller unit from the copier.
2) Remove two springs.
3) Remove four screws then the blade.



① Springs
② Screws
③ Blade

Figure 4-830

4) Remove the E ring then the gear and bushing. When removing the gear, be careful not to lose the pin.



① E ring
② Gear

Figure 4-831

5) Remove the oil applying roller.

I. INSTALLATION SUGGESTIONS

It is recommended that a serviceman personally inspect the customer's premises before installing a printer. The location should meet the following requirements.

A The line voltage should not vary more than ±10% from the voltage marked on the copier rating plate.

B The Operating temperature and relative humidity should be within the ranges given in Figure 5-1. Location close to water faucets, humidifiers, air conditioning outlets, and refrigerators should be avoided.

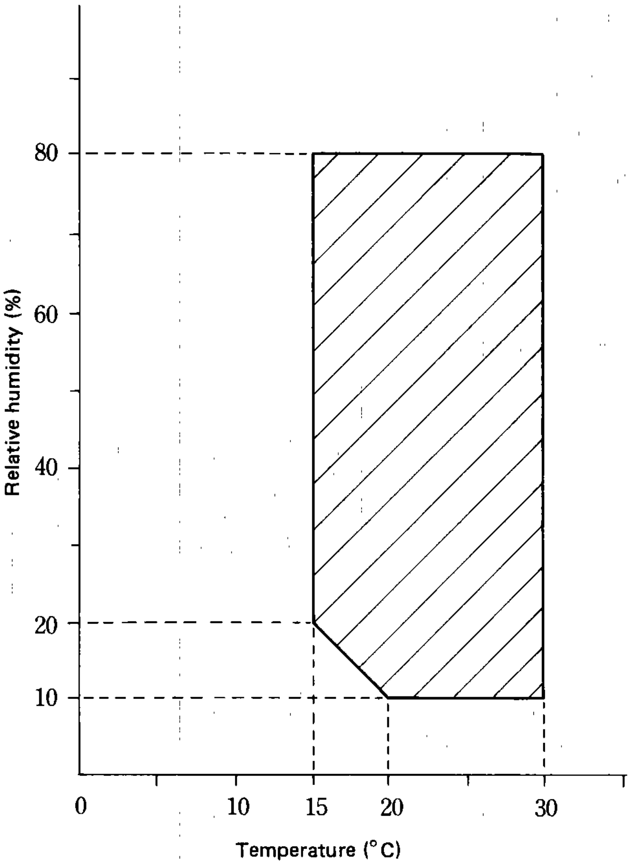


Figure 5-1 Permissible environmental Conditions

C The printer should not be exposed to open flames, dust, ammonia fumes, or direct sunlight. A heavy curtain can be put up to protect the copier if it must be installed in a location receiving direct sunlight.

D The room should be well ventilated.

E The printer should be installed level on a sturdy support, such as a pedestal or desk, with all feet in film contact.

F The copier should be located at least 100 mm (4″) from the wall behind it, and there should be sufficient space to permit unimpeded operation.

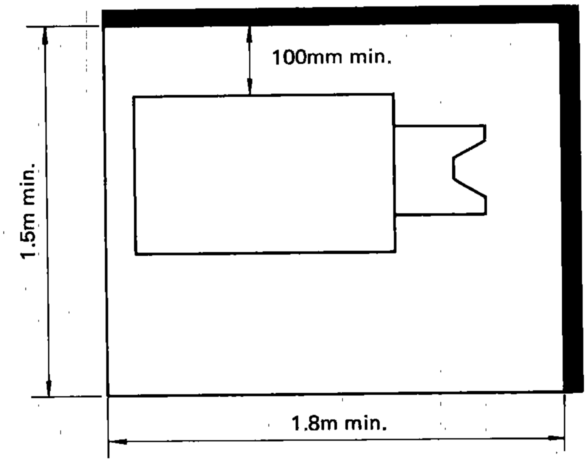


Figure 5-2

II. UNPACKING AND INSTALLATION

Note: Bringing a machine from storage in a cold area into a warm room can cause condensation on the metal and glass parts that will adversely affect printer performance. In such conditions, move the packing crate into the warm room and leave it unopened for at least one hour to allow the machine to warm up.

No.	Procedure	Check	Remarks
1	Remove the main unit from its packing.		
2	Remove the printer from the box.		The printer weighs 205 kg, so it should be lifted by 6 persons.
3	Open the accessory box and remove the contents.	Check that the following items are present. · Photosensitive drum · Copy tray · Manual feed tray · Silicone oil bottle/valve · Yellow, magenta, cyan and black toners · Yellow, magenta, cyan and black start developer · Three screws · Key	
4	Remove the inner front cover.		
5	Attach the valve to the silicone oil bottle and place the bottle on its mount.	Check that the waste oil bottle is attached.	
6	Install the Image Scanner unit.		See the Image Scanner Manual, Chapter 5, for the procedure.
7	Attach the connector cable and power cable between the Image Scanner unit and printer.		See Figure 5-3
8	Remove two screws and move the upper cover to the right side.		
9	Loosen the screws of the scanner locking plate and shift the locking plate to the right to release the scanner.	Confirm that the shaft, of the scanner motor rises when the plate is released.	See Figure 5-4
10	Reattach the upper cover.		
11	Remove the left side panel and the rear panel.		
12	Remove the four developing unit packing.	Make sure there is no dirt or scratches on the developing cylinder.	
13	Take off the developing unit caps and insert starter in them.	Check the position of the developing unit toner supply inlet, an make sure the correct starter is inserted.	See Figure 5-5, 5-6
14	Replace the cap to the developing unit. Hold the developing unit and turn it (gently) 90° in both directions several times.		See Figure 5-7
15	Turn the developing unit gears to coat the developing cylinder with developer.		See Figure 5-5
16	Remove the toner feed port stop from the toner collection assembly.		

No.	Procedure	Check	Remarks
17	Turn the turret so that the toner feed port for the red color come to the bottom.	If toner is put into the hopper while the stop is not attached to the toner feed port on the turret, toner may spill out of the toner feed port.	See Figure 5-8 Do not pull off the toner feed port stop right after replenishing the toner. Allow about 30 seconds for the scattering toner to settle down and then pull off the stop.
18	Attach the toner feed port stop to the toner feed port on the turret.		
19	Replenish the red toner into the hopper.		
20	Repeat steps 17) to 19) for all the toner colors.		
21	Remove the stop from the toner feed port on the turret.		Attach the toner feed port stop to developer collection receptacle and store it.
22	Put copy paper in the cassettes and then put the cassettes into the copier.		
23	Attach the copy tray to the Manual tray.		
24	Take out the two screws and the connector remove the transfer drum.	Check that there is no slack in the transfer drum sheet.	
25	Remove the drum cleaning unit.		
26	Remove the primary corona unit.		
27	Remove the drum centering plate.		
28	Pull the handle of the surface potential sensor unit.		
29	Remove the drum fixing ring.		
30	Connect the extension shaft to the drum shaft.		
31	Wind the light-blocking sheet on the drum and insert it into the printer.		
32	Remove the extension shaft.		
33	Attach the drum fixing ring.	The rings should be aligned with the side of the drum along their height.	
34	Attach the drum centering plate.	Check that the potential sensor unit is in position.	
35	Remove the light-blocking sheet from the drum.		
36	Install the primary corona unit.		
37	Attach the transfer drum.		
38	Plug in the power cord and switches the printer and scanner ON.		
39	In the Service mode, press the following keys. $\boxed{*}\ \boxed{4}\ \boxed{*}\ \ \boxed{*}\ \boxed{1}\ \boxed{0}\ \boxed{6}\ \boxed{*}\ \ \boxed{1}\ \boxed{*}$		
40	In the Service mode, press the following keys $\boxed{*}\boxed{4}\boxed{*}$ M toner $\boxed{*}\boxed{1}\boxed{2}\boxed{4}\boxed{*}$		
41	Press $\boxed{1}$ $\boxed{*}$ key repeatedly until toner starts falling from the toner replenishment outlet.	Put the paper under the turret.	

No.	Procedure	Check	Remarks
42	Repeat steps 40) to 41) for all the toner. C toner * 1 2 5 * Y toner * 1 2 6 * B K toner * 1 2 7 *		
43	Attach all the developing unit.		
44	Adjust the toner density sensing circuit.		See Chapter 7.
45	In the Service mode, press the following keys. * 4 * * 1 5 2 * 1 *		Apply toner to the drum.
46	Apply toner to the edge of the cleaning blade.		See Figure 5-9
47	Install the drum cleaning unit.		
48	Turn the knob of the transfer drum assembly to clean residual toner off the drum surface.		
49	In the Service mode, press the following keys. This cause the drum potentials to be adjusted. * 4 * * 1 0 1 * 1 *		
50	Place a test sheet on the copyboard and check copy operation. If the copy quality is normal, perform the procedure from step 53.	· Check that the correct number of copies is made for each setting. · Confirm that there are no unusual sounds. · Check the copy quality.	If the quality is abnormal when copy quality is checked, adjust according to the Basic Image Adjustment Procedure. If it does not return to normal, perform the procedure from step 51.
51	In the Service mode (* 1 *), check the following data. * 2 2 1 * (250 ~ 700) * 2 2 5 * (50 ~ 300) * 2 3 1 * (250 ~ 900) * 2 3 5 * (100 ~ 700)	If a value is outside the expected range, check the potential control system and the laser system.	
52	If copy density is extremely faint or extremely dark, adjust using one of the following Service modes. * 3 * Density too faint: * 1 0 5 * Density too dark: * 1 0 4 *	Press key 1 *. Check image density. If it is not normal, try switching from automatic to manual setting of target contrast potential. (Set display to "1" with * 3 * * 1 0 1 *)	
53	Set the user's specifications using the user specification setting mode of the service mode.		
54	Attach all covers.		
55	Move the printer to the specified location.		
56	Using spirit level (CK-0059), adjust the adjustment legs so that the printer is horizontal.	See Figure 5-10 for the measurement position of the standard equipment.	If the floor under the printer is weak, or if the machine cannot be levelled, place the printer on a sturdy steel plate, etc., the area of which is larger than the bottom of the printer.
57	Write the necessary data on the service sheet.		

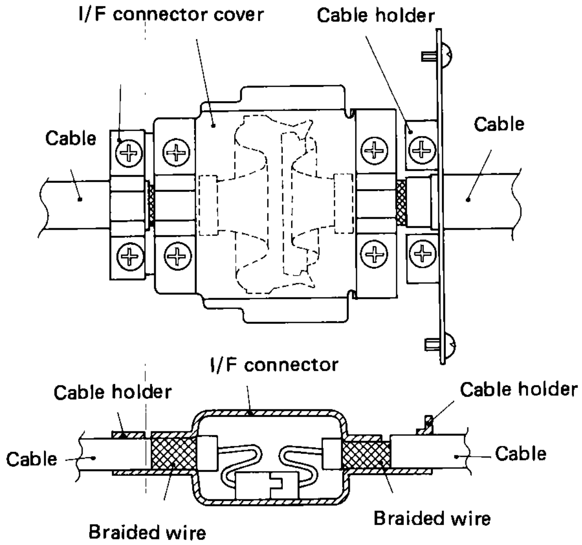

I/F connector cover
Cable holder
Cable
Cable
I/F connector
Cable holder
Cable holder
Cable
Cable
Braided wire
Braided wire

Figure 5-3

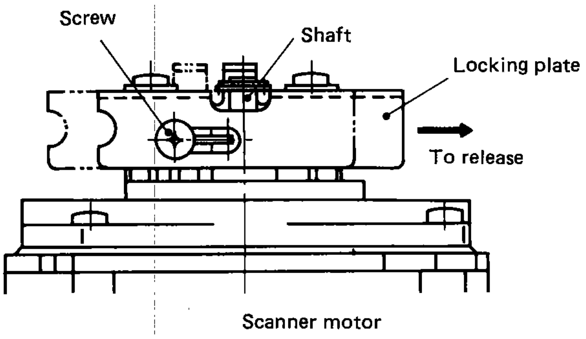
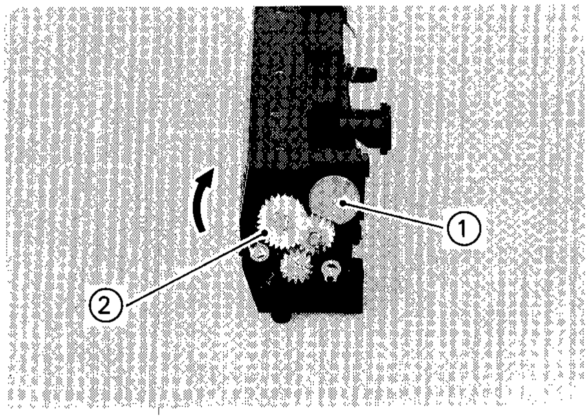
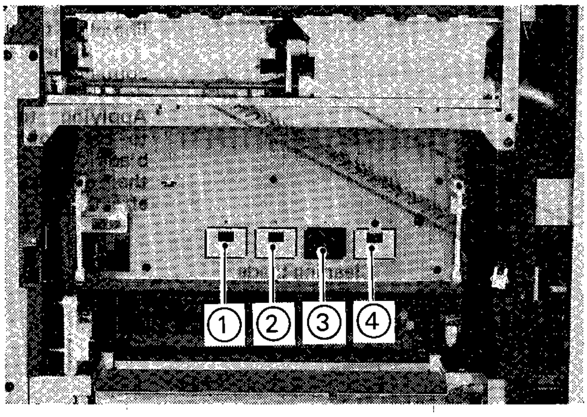

Screw
Shaft
Locking plate
To release
Scanner motor

Figure 5-4



① Cap ② Gear

Figure 5-5



① Y ③ C
② M ④ BK

Figure 5-6

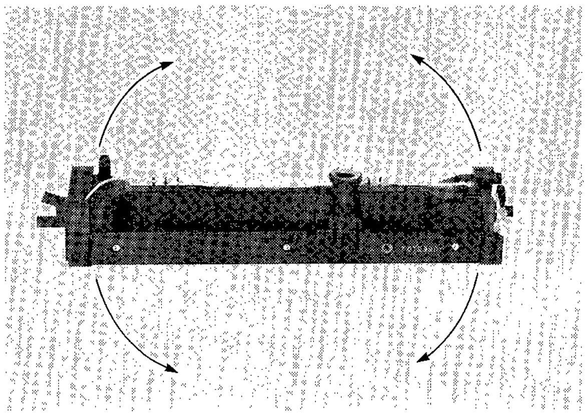
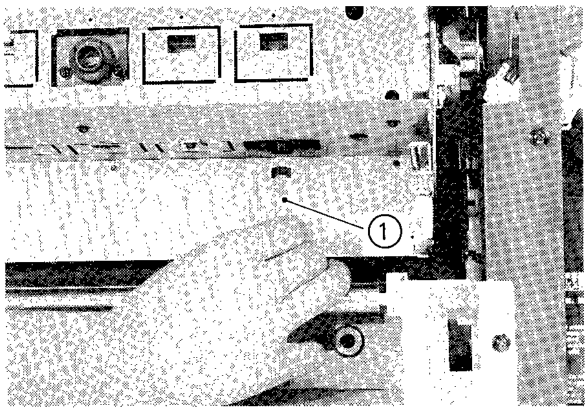


Figure 5-7



① Toner-feed port STOP

Figure 5-8

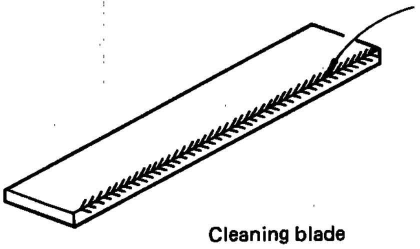
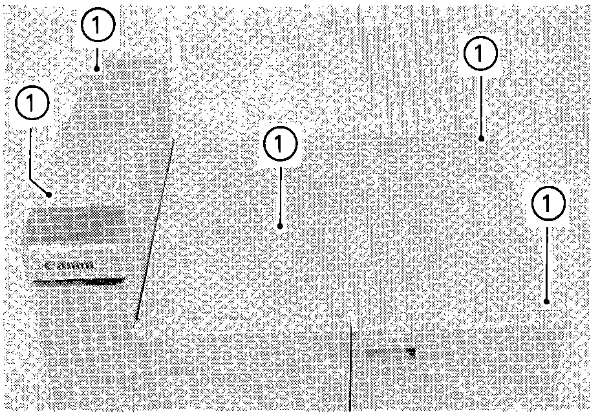

Apply toner liberally to the edge of the blade contacting the drum.
* Applying toner to parts of the blade other than the edge has no effect.
Cleaning blade

Figure 5-9



① Measurement position

Figure 5-10

III. MOVING THE PRINTER

The following steps should be taken if the printer has to be transported to another location by truck, etc., after having been installed.

No.	Procedure	Check	Remarks
1	Remove the toner in the hopper.		Use the service mode (P234~P237)
2	Pack the Image Scanner unit.		See Image Scanner Manual Chapter 5 for instructions.
3	Move the printer upper cover to the right.		
4	Loosen the screws of the scanner unit locking plate, push the scanner motor shaft down, shift the locking plate to the left, and secure the plate in that position.	· Check that the shaft is held down correctly.	See Figure 5-2
5	Remove the left plate.		
6	Remove all the developing unit.	The developing unit should be transported in separate packing.	
7	Put tape over the toner feed ports (to turret).		
8	Remove the photosensitive drum.	The drum should be protectively wrapped and transported separately.	
9	Remove the silicone oil feed bottle.	Transport separate packing.	
10	Remove the waste oil bottle.		
11	Wipe off the oil where it has been applied.		
12	Wrap the transfer drum release lever and knob in cloth.		
13	Wrap the registration unit release lever in cloth.		
14	Replace the left plate and upper cover.		
15	Fasten the front door, delivery unit and hopper cover in place using tape.		

I. PARTS TO BE REPLACED PERIODICALLY

Parts scheduled for replacement should be changed before any troubleshooting or repair is performed, even though they may be functioning properly and show no signs of wear. This is a safety precaution and helps to maintain the printer at its peak performance. Parts should be replaced during the regular service visit closest to the end of the service life of the part.

OCT., 1987

No.	Description	Part No.	Q'ty	Service life (Number of prints)	Remarks
1	Grid wire (primary corona unit)	FY1−0581−000	1	5,000	
2	Filter (M10)	FA4−9216−000	1	20,000	
	Filter (M10)	FA4−9220−000	1	20,000	
3	Ozone filter	FG1−7117−000	1	20,000	or every year
4	Filter (Primary corona fan)	RA1−1198−000	1	20,000	
5	Filter (M9)	FA4−9208−000	1	20,000	
6	Primary corona wire	FY3−0030−000	1	20,000	100V
	Primary corona wire	FY3−0040−000	1	20,000	115/220/240V
7	Primary corona wire cleaner	FF1−7552−020	1	20,000	
8	Filter (inner exhaust fan)	FA4−9073−000	1	20,000	
9	Cleaning brush (transfer drum unit)	FA4−8874−000	1	100,000	
10	Developing bias brush	FA4−8402−020	1	100,000	
11	Power supply brush (drum heater)	FA3−0859−040	1	100,000	
12	Power supply ring (drum heater)	FA3−0858−000	1	100,000	
13	Plate (drum heater)	FA4−8356−000	1	100,000	
14	Developing cylinder roller (spacer)	FS1−6271−000	8	250,000	
15	Side seal (developing unit)	FA4−8939−000	4	250,000	
		FA4−8938−000	4		

Note: Numbers indicated in the table are estimates only and are subject to change with experience.

II. EXPECTED SERVICE LIVES OF CONSUMABLES

The parts listed below may require replacement during the warranty period, but are to be replaced only if they are faulty or worn. The expected service lives of these parts are as follows.

OCT., 1987

No.	Description	Part No.	Q'ty	Service life (Number of prints)	Remarks
1	Start developer Y	F41–5132–000	1	20,000	
2	Start developer M	F41–5122–000	1	20,000	
3	Start developer C	F41–5112–000	1	20,000	
4	Start developer BK	F41–5102–000	1	20,000	
5	Silicone oil S-20	KF8–0005–000	1	10,000	1 liter/bottle
6	Cleaning blade (cleaning assembly)	FA4–8943–020	1	10,000	
7	Preconditioning exposure lamp	FH7–3095–000	1	20,000	
8	Transfer drum sheet (transfer drum unit)	FA5–0931–000	1	20,000	
9	Sheet (transfer drum unit)	FF1–9228–000	1	20,000	
10	Roller cleaner (developing unit)	FA4–8649–000	1	20,000	
		FA4–8650–000	1	20,000	
11	Lamp (toner reservoir sensor)	FF1–9225–000	1	20,000	
12	Side seal (front) (cleaning unit)	FA4–8951–000	1	20,000	
13	Side seal (rear) (cleaning unit)	FA4–8952–000	1	20,000	
14	Sweeper sheet (cleaner assembly)	FF1–7555–000	1	20,000	
15	Blush (cleaning unit)	FF1–7558–000	1	20,000	
		FF1–7559–000	1	20,000	
16	Cleaning belt (fixing unit)	FA3–8908–000	2	20,000	
17	Upper roller (fixing unit)	FA4–9096–020	1	*1 20,000	
18	Scraper (transfer drum unit)	FF1–7703–040	1	50,000	
19	P.D. scraper (transfer drum unit)	FF1–9056–000	2	50,000	
20	Pick-up roller (pick-up unit)	FF9–0581–030	4	100,000	
21	Feed roller (pick-up unit)	FA3–8733–020	2	100,000	
22	Separation roller (pick-up unit)	FA4–8991–000	2	100,000	
23	Lower roller (fixing unit)	FA4–9097–000	1	100,000	
24	Heater tube (fixing unit)	FH7–4208–000	2	100,000	100V
	Heater tube (fixing unit)	FH7–4209–000	2	100,000	115V
	Heater tube (fixing unit)	FH7–4211–000	2	100,000	220V
	Heater tube (fixing unit)	FH7–4212–000	2	100,000	240V
25	Heater tube connector (fixing unit)	FF1–7704–000	4	100,000	
26	Lower roller blade (fixing unit)	FA2–8296–000	1	200,000	
27	Separation claw (lower) (delivery unit)	FA4–9149–000	5	200,000	
28	Oil applying roller (oil unit)	FA4–9186–020	1	200,000	
29	Braid (oil applying unit)	FA9–1647–000	1	200,000	
30	Developing cylinder (developing unit)	FA4–8621–000	4	300,000	

Note: Numbers indicated in the table are only estimates, and are subject to change.

*1 **Service life for upper roller of fixing unit**
Service life has been tentatively established as 8,000 prints. However, with the improvement in the material for the roller in future, service life of 8,000 prints is expected to become 20,000 prints.

III. BASIC PROCEDURES FOR PERIODIC SERVICING

Note:

1. As a rule, periodic servicing should be performed after every 5,000 prints.
2. Before making a visit, check the customer's file and pack any replacement parts that are likely to be needed.

No.	Procedure	Check	Remarks
1	Note the operator's comments.	Verify the condition of the machine.	
2	Note the counter reading.	Record the number of mis-copies.	
3	Make test prints: ENLARGEMENT, REDUCTION, DIRECT	a. Print density b. Background c. Sharpness of lines d. Leading-edge blank width e. Left, right and bottom margins f. Fixing marks on backs of prints g. Unusual noise from copier. h. Operation of counters.	Standard: 8±1mm (Leading-edge blank area) Standard: 2±1.5mm (Left and right blank area) Standard: 2±1.5mm (Trailing edge blank area)
4	Clean the wires and frame of each corona unit		Clean with alcohol after drying off with lint-free paper.
5	Clean the transfer drum and delivery units · Separation claw · Toner collecting tray		
6	Clean the fixing and delivery units. · Paper guides · Separation claw (upper and lower) · Inspect the cleaning belt		MEK MEK
7	Perform the service procedure corresponding to the number of copies (refer to Page 6-4).		
8	Clean the copyboard cover and the copyboard glass.		
9	Check the amount of waste toner.		
10	Make test prints.		
11	Make sample prints.		
12	Check the test prints and clean up the printer and the surrounding area.		
13	Note the final counter reading.		
14	Enter all relevant information on the service sheet. Inform the operator that the serving has been completed.		

IV. PREVENTIVE MAINTENANCE SERVICING SCHEDULE

Note: Do not used solvents or oils other than those specified.

△ : Clean ● : Replace × : Lubricate □ : Adjust ○ : Check

Unit	Description	Maintenance servicing						Remarks
		Every 5,000 prints	Every 10,000 prints	Every 20,000 prints	Every 50,000 prints	Every 100,000 prints	Every 250,000 prints	
Externals	Copyboard glass (Image Scanner unit)		△					Clean using Alcohol.
	Copyboard cover (Image Scanner unit)		△					
	Ozone filter			●				Replace after one year.
	Clutch springs					×		Lubricate all the printer clutch springs with low-viscosity lubricating oil.
	Filters			●				
	Developing bias brash					●		
	Power supply brash (drum heater)					●		
	Power supply ring (drum heater)					●		
	Leaf spring (drum shaft)					●		
Feeder unit	Feeder belt				△			Use a moist cloth.
	Paper guide plate				△			
Illumination intensity assembly	Fiber optic lens (Image Scanner unit)		△					Lint-free paper.
	Document scanning reflection umbrella (Image Scanner unit)		△					Blower brush.
	Dustproofing glass		△					Lint-free paper.
Corona units	Primary corona wire cleaner			●				Wipe of with dry lint-free paper, then clean with alcohol.
	Primary corona unit grid wire	●						
	Primary corona wire	△		●				
	Transfer corona unit		△					
	Static charge eliminating corona units		△					
	Separation corona unit		△					
	Pre-fixing corona unit		△					
Developing unit	Roller			△			●	
	Side seal						●	
Transfer drum unit	Transfer drum unit paper sensor (Q18)		△					
	Separation unit paper sensor (Q17)		△					
	Cleaning brush					●		
	Magnet roller blade		△					
Fixing unit	Paper guide		△					Use MEK.
	Upper and lower fixing rollers		△					
	Separation claws (upper and lower)		△					Use MEK.
	Thermistor			△				
	Lower roller blade			△				
Oil applying roller unit	Blade			△				
Waste toner receptacle	Waste toner receptacle		○ ●					

Using the troubleshooting tables

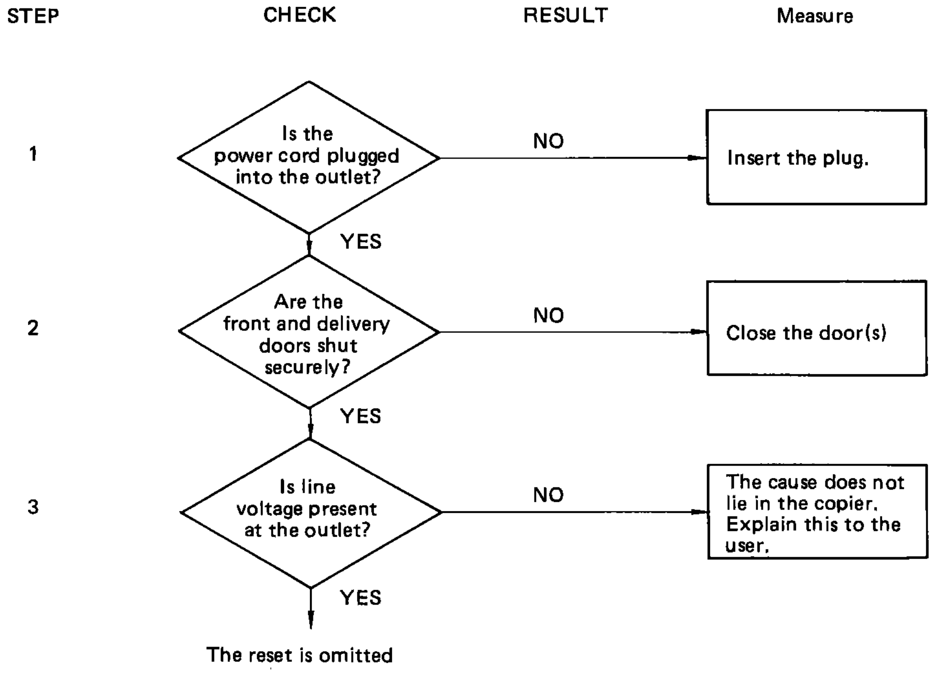
The troubleshooting tables in this chapter are adapted from flow charts. The following example shows how to use these tables.

Example: AC power is not supplied.

Cause/location	Step	Check	Result	Measure
Power cord	1	Is the power cord plugged into the outlet?	NO	Plug in the cord.
Door position not completely shut	2	Are the front doors and delivery doors shut securely?	NO	Shut the doors.
Power supply	3	Is line voltage present at the outlet?	NO	The cause does not lie in the copier. Explain this to the user.
	4	Is line voltage present between J1-1 and J1-2? (J1 is located near the power cord mount.)	YES	Go to step 6.

(The rest is omitted)

- Refer to "Cause/location of fault" for possible causes (defective parts) of a particular problem. In the above example (AC power is not supplied), possible causes are a disconnected power plug, open doors, a dead outlet, etc.
- Follow steps in the order given to determine the correct measure and check procedure for a particular problem. The answer to the question in "Check" is either YES or NO. When the answer agrees with "Result", perform the operation in "Measure". If the answer does not agree, proceed to the next step and do the check indicated there.

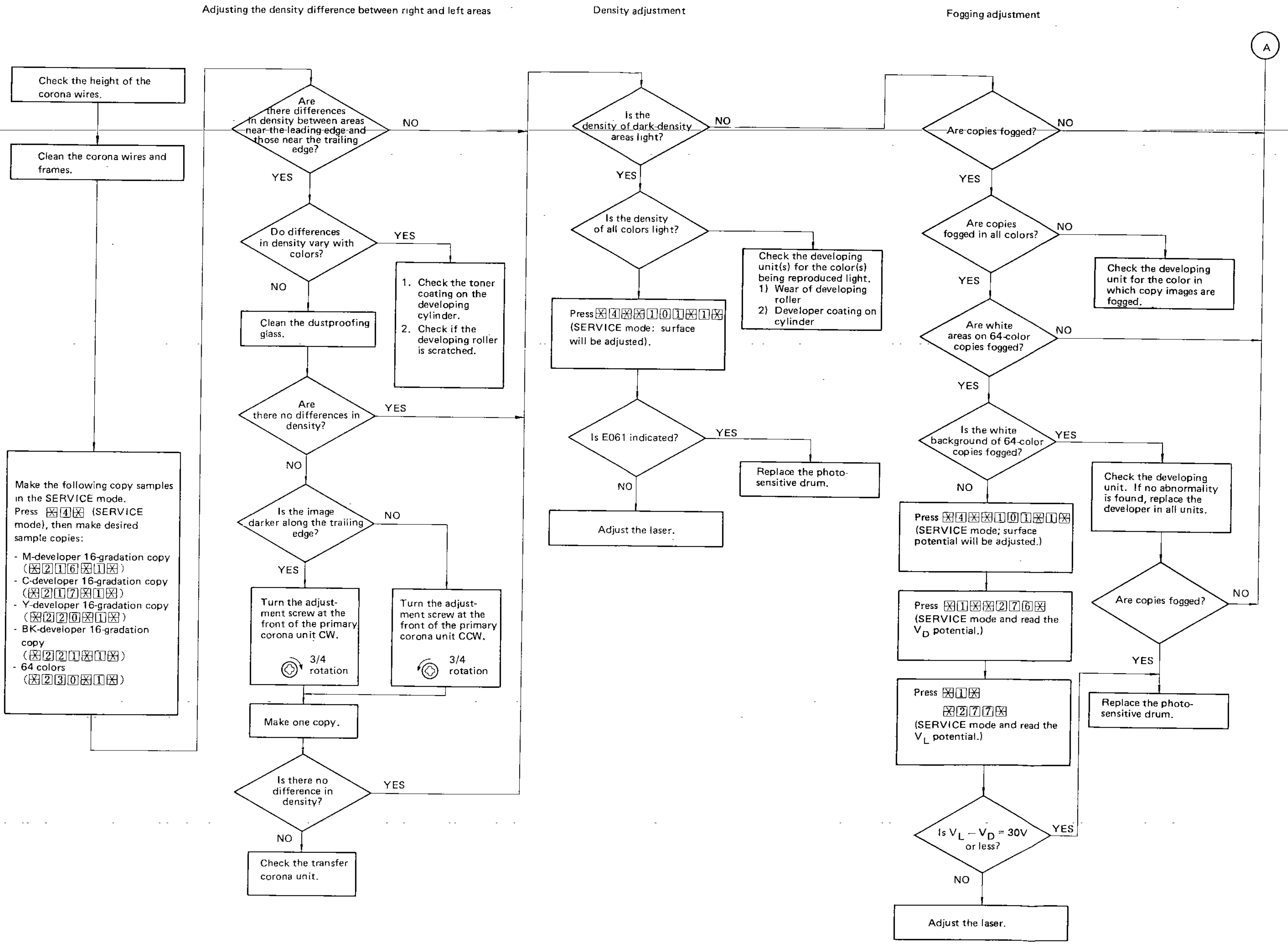

STEP
CHECK
RESULT
Measure
1
Is the power cord plugged into the outlet?
NO
Insert the plug.
YES
2
Are the front and delivery doors shut securely?
NO
Close the door(s)
YES
3
Is line voltage present at the outlet?
NO
The cause does not lie in the copier. Explain this to the user.
YES
The reset is omitted

- When a voltage is to be checked with a multimeter, the "Check" column contains an instruction such as "Measure the voltage between J109-1(+) and J109-2(−) on the DC controller PC board." In this instruction, (+) or (−) after the connector No. indicates the terminal to which the positive or the negative probe, respectively, of the multimeter should be connected.

Example: J109-1(+) --- Positive probe to J109-1
J109-2(−) --- Negative probe to J109-2

I. MAINTENANCE AND INSPECTION

A. Basis Image Adjustment Procedure


Adjusting the density difference between right and left areas
Density adjustment
Fogging adjustment
A
Check the height of the corona wires.
Clean the corona wires and frames.
Make the following copy samples in the SERVICE mode.
Press *4* (SERVICE mode), then make desired sample copies:
- M-developer 16-gradation copy (*216*1*)
- C-developer 16-gradation copy (*217*1*)
- Y-developer 16-gradation copy (*220*1*)
- BK-developer 16-gradation copy (*221*1*)
- 64 colors (*230*1*)
Are there differences in density between areas near the leading edge and those near the trailing edge?
NO
YES
Do differences in density vary with colors?
YES
NO
1. Check the toner coating on the developing cylinder.
2. Check if the developing roller is scratched.
Clean the dustproofing glass.
Are there no differences in density?
YES
NO
Is the image darker along the trailing edge?
NO
YES
Turn the adjustment screw at the front of the primary corona unit CW.
3/4 rotation
Turn the adjustment screw at the front of the primary corona unit CCW.
3/4 rotation
Make one copy.
Is there no difference in density?
YES
NO
Check the transfer corona unit.
Is the density of dark-density areas light?
NO
YES
Is the density of all colors light?
Check the developing unit(s) for the color(s) being reproduced light.
1) Wear of developing roller
2) Developer coating on cylinder
Press *4**101*1* (SERVICE mode: surface will be adjusted).
Is E061 indicated?
YES
Replace the photosensitive drum.
NO
Adjust the laser.
Are copies fogged?
NO
YES
Are copies fogged in all colors?
NO
Check the developing unit for the color in which copy images are fogged.
YES
Are white areas on 64-color copies fogged?
NO
YES
Is the white background of 64-color copies fogged?
YES
Check the developing unit. If no abnormality is found, replace the developer in all units.
NO
Press *4**101*1* (SERVICE mode; surface potential will be adjusted.)
Press *1**276* (SERVICE mode and read the V_D potential.)
Press *1* *277* (SERVICE mode and read the V_L potential.)
Is V_L − V_D = 30V or less?
YES
NO
Adjust the laser.
Are copies fogged?
NO
YES
Replace the photosensitive drum.

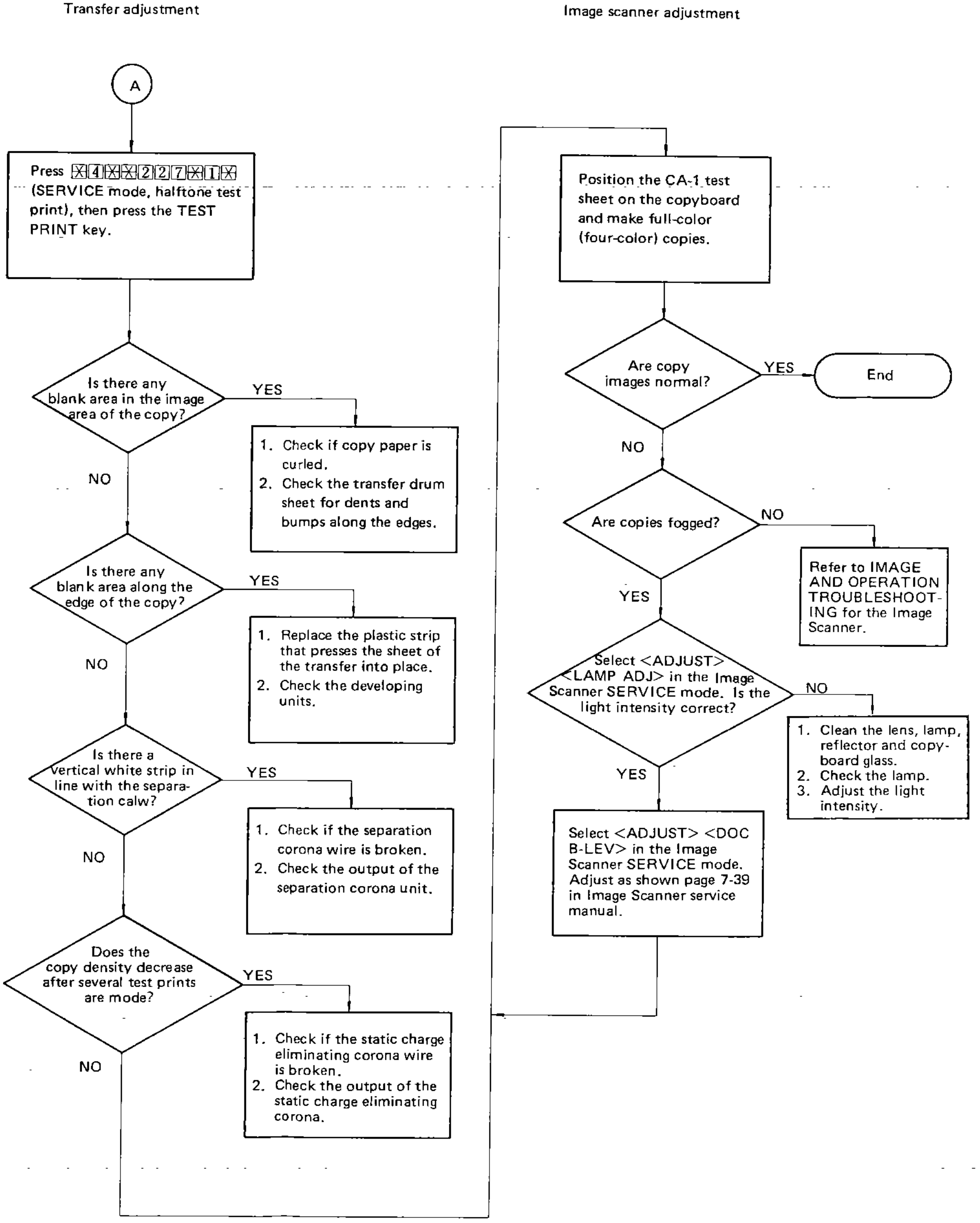

Transfer adjustment

Image scanner adjustment

A
Press ※4※※227※1※ (SERVICE mode, halftone test print), then press the TEST PRINT key.
Is there any blank area in the image area of the copy?
YES
1. Check if copy paper is curled.
2. Check the transfer drum sheet for dents and bumps along the edges.
NO
Is there any blank area along the edge of the copy?
YES
1. Replace the plastic strip that presses the sheet of the transfer into place.
2. Check the developing units.
NO
Is there a vertical white strip in line with the separation calw?
YES
1. Check if the separation corona wire is broken.
2. Check the output of the separation corona unit.
NO
Does the copy density decrease after several test prints are mode?
YES
1. Check if the static charge eliminating corona wire is broken.
2. Check the output of the static charge eliminating corona.
NO
Position the CA-1 test sheet on the copyboard and make full-color (four-color) copies.
Are copy images normal?
YES
End
NO
Are copies fogged?
NO
Refer to IMAGE AND OPERATION TROUBLESHOOTING for the Image Scanner.
YES
Select <ADJUST> <LAMP ADJ> in the Image Scanner SERVICE mode. Is the light intensity correct?
NO
1. Clean the lens, lamp, reflector and copyboard glass.
2. Check the lamp.
3. Adjust the light intensity.
YES
Select <ADJUST> <DOC B-LEV> in the Image Scanner SERVICE mode. Adjust as shown page 7-39 in Image Scanner service manual.

<Developing assembly check>

a. Checking the optical fiber unit in the developing assembly

(1) Is much developer scattered?
(2) Is the color of the developer in the developing assembly much darker than the start developer?
(3) Does the optical fiber unit appear damaged?
(4) Are abnormal values indicated when the following are checked in the service mode?

※1※

※260※ (M developing assembly reference value)
※261※ (C developing assembly reference value)
※262※ (Y developing assembly reference value)
※263※ (BK developing assembly reference value)

(5) Drain the developer out of the developing assembly and remove the optical fiber unit.
Is the detection window of the optical fiber unit broken, allowing the developer to enter the unit?

If any abnormality is found in the above check, replace the optical fiber unit, then replace the developer.

b. Checking the developing roller

(1) Is the developing roller scraped?
(2) Is the surface of the developing roller stained with toner?

If any abnormality is found in the above check, replace the developing roller.

c. Checking the developing cylinder

(1) Is the developing cylinder evenly covered with toner?
(2) Are the magnetic poles of the developing cylinder positioned correctly?

If any abnormality is found in the above check, clean and adjust the developing cylinder.

Replace the developing assembly if copy images are still fogged or light after following a, b, and c.

Location	Tool/solvent	Servicing/precaution
Primary corona unit	- Alcohol - Lint-free paper	Wipe with a dry cloth, then clean with lint-free paper moistened with alcohol.
Transfer corona unit, Static change eliminating corona unit		
Pre-fixing corona unit		

Location	Tool/solvent	Servicing/precaution
Dustproofing glass	Blower brush or alcohol and lint-free paper	Clean the glass with a blower brush Use alcohol to remove stubborn marks.

Location	Tool/solvent	Servicing/precaution
Magnet-roller toner receptacle	Moist cloth	Cleaning
Transfer unit paper sensor Separation unit paper sensor	Lint-free paper	Wipe with a dry cloth
Paper pick-up guide, Separation claw, Feeder belts	Moist cloth	Cleaning

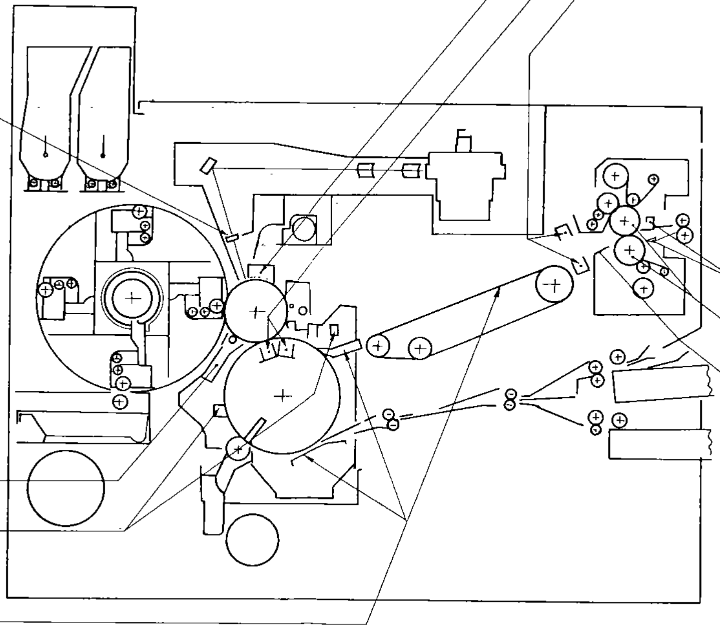


Figure 7-1

Location	Tool/solvent	Servicing/precaution
Separation claws	MEK	Cleaning
Upper fixing roller, Lower fixing roller	Lint-free paper	Wipe with a dry cloth.
Paper guide	MEK	Cleaning

II. SPECIFICATIONS AND ADJUSTMENT

A. Mechanical System

1. Leading edge blank area

Press [*] [4] [*] [*] [2] [1] [4] [*] [1] [*] (SERVICE mode, "horizontal, 16 mm-wide stripe test print"), then press the TEST PRINT key.

The distance between the leading edge of the paper and that of the first black stripe should be 8 ± 1 mm.

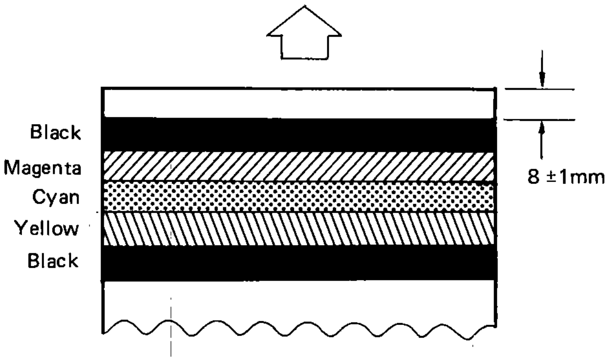


Figure 7-2

Adjust the leading edge blank area by changing the position of the light blocking plate of the image leading edge sensor (Q15) inside the transfer drum.

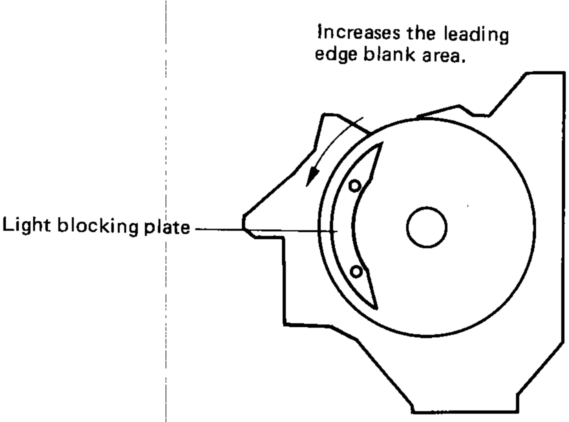


Figure 7-3

B. Electrical System

The main PC boards have variable resistors (VRs) that are adjusted at the factory and should not be adjusted during servicing. They require high-precision instruments. Adjust only the VRs listed below.

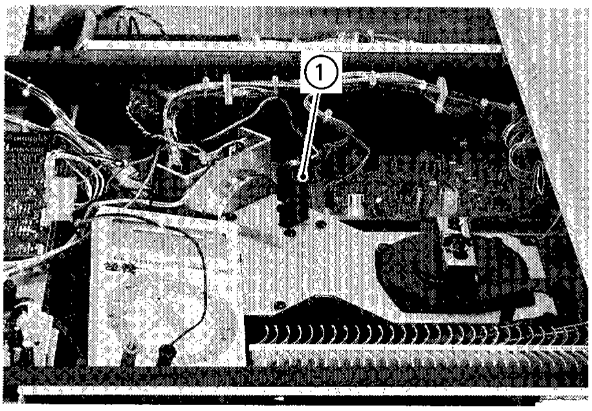
1. Adjusting laser power

Adjust the laser power if the laser unit, or DC controller PCB is changed.

a. Tools
- Laser power tester (TKN-0198)
- Digital multimeter (CK-0436)

Note:
The output of the laser power tester may change with time. It should be calibrated every year at the service office using the calibrator specifically designed for this purpose.

b. Adjustment procedure
1) Set the printer power switch OFF.
2) Remove the upper and rear covers.
3) Turn VR101 and VR116 on the DC controller PCB clockwise until they turn freely. Turn VR100 counterclockwise until it turns freely.
4) Loosen the screw fastening the cover of the port of the laser power tester and open the cover.
5) Insert the laser power tester into the port.
6) Set the digital multimeter to the 200 mVDC range, then plug the leads from the laser power tester into the multimeter.



① Laser power tester

Figure 7-4

7) Insert the door switch actuating tool in the door switch, then set the power switch ON.
8) Press [*] [4] [*] [*] [1] [1] [1] [*] [1] [*] (SERVICE mode, "Laser ON 1"). The laser will go ON.

9) Read the label attached to the laser unit and note the upper power limit.
Adjust VR100 so that the meter shows the same reading as printed on the label.

No. XXXXXX
Pmax = XXXX ± 0.5 mV

Figure 7-5

- Turn VR100 slowly while observing the meter. Do not exceed the Pmax value on the label, otherwise the laser could be destroyed.

10) Multiply the Pmax value by 0.932, then adjust VR101 so that the meter shows this reading (± 0.5 mV).
11) Press $\boxed{0}\boxed{*}$).
12 Press $\boxed{*}\boxed{1}\boxed{1}\boxed{2}\boxed{*}\boxed{1}\boxed{*}$. The laser will go ON.
13) Multiply the Pmax value by 0.635, then adjust VR116 so that the meter shows this reading (± 0.5 mV).
14) Press $\boxed{0}\boxed{*}$, then press $\boxed{C}$ twice.
15) Adjust the laser power VRs.
16) Set the power switch OFF.
17) Remove the laser power tester and the door switch actuating tool.
18) Re-install all covers.

2. Adjusting the laser power VRs

1) Set the printer power switch OFF.
2) Remove the upper cover and the rear panel.
3) Set SW101 and SW102 (on the DC controller PCB) ON.
4) Loosen the screw fastening the cover for the laser power tester port. Slide the cover open.
5) Insert the laser power tester in the port.
6) Set the digital multimeter to the 200 mVDC range, then plug the leads from the laser power tester into the multimeter.
7) Insert the door switch actuating tool into the door switch.
8) Swing the drum cleaning unit out of the way.
9) Set the power switch ON.
10) Press [*][4][*] (SERVICE mode, SWITCH mode).
11) Enter the desired SERVICE mode address. (Refer to Table 7-2.)
12) Press [1][*] . The laser will go ON.
13) Set SW100-1 (on the DC controller PCB) ON.
14) Read the multimeter with SW100-2 (on the DC controller PCB) ON, then with it OFF, leave SW100-2 OFF.
15) Compare the two measurements with the standard value (see Table 7-2), then select the required VR by the criteria of Table 7-1.
16) Read the value of Pmax on the label attached to the laser unit, and multiply it by 0.0113, then set the required VR so that the meter shows this reading (± 0.1 mV).
17) Set SW100-2 (on the DC controller PCB) ON and read the multimeter.
18) If the measurement is greater than the standard value for B, turn VRII a small amount counterclockwise.
If it is smaller, turn VRII a small amount clockwise.
19) Set SW100-2 OFF and adjust VRI to obtain the following value.
0.0113 × Pmax ±0.1 mV
20) Set SW100-2 ON and check that the measurement equals the standard value for B. If not, repeat step 16), etc.
21) Make the adjustments of A and B for parts 2 through 4 in Table 7-2 by the same procedure (steps 11, through 20).
22) Set the power switch OFF.
23) Set SW101 and SW102 OFF.
24) Set SW100-1 and SW100-2 OFF.
25) Remove the laser power tester and door switch actuating tool.
26) Re-install all covers.

SW100 – 2ON SW100 – 2OFF	Standard value B > measurement	Standard value B < measurement
Standard value A > measurement	Turn VRI clockwise.	Turn VRII clockwise.
Standard value A < measurement	Turn VRII counterclockwise.	Turn VRI counterclockwise.

Table 7-1

No.	DC controller PCB		SERVICE mode address	Adjustment VR		Standard value mV	
	SW100-1	SW100-2		I	II		
1	ON	OFF	[*][1][1][3][*]	VR108	VR109	A	0.0113×Pmax±0.1
		ON				B	0.724×Pmax±0.5
2	ON	OFF	[*][1][1][4][*]	VR110	VR111	A	0.0113×Pmax±0.1
		ON				B	0.466×Pmax±0.5
3	ON	OFF	[*][1][1][5][*]	VR113	VR112	A	0.0113×Pmax±0.1
		ON				B	0.847×Pmax±0.5
4	ON	OFF	[*][1][1][6][*]	VR115	VR114	A	0.0113×Pmax±0.1
		ON				B	0.550×Pmax±0.5

Table 7-2

3. Adjusting the toner concentration sensing circuit

a. Adjusting the toner concentration sensing circuit for all colors.
Make this adjustment at the following times:

- When toner of all colors is replaced (simultaneously),
- When starter of all colors is replaced (simultaneously),
- When the toner concentration sensor lamp is replaced.

1) Put start developer in each developing unit, then install the developing units in the copier.
2) Press [*] [4] [*] [*] [1] [3] [0] [*] (display PCB).
3) Press [1] [*] . The machine will operate for about 3.5 minutes to stir the start developer. (The machine stops automatically after stirring.)
4) Press [*] [1] [3] [1] [*] [1] [*], then adjust VR403 (on the display PCB) to obtain 4.00 ± 0.20 V. (The voltage is indicated by the 7-segment LED display on the display PC Board.)
5) Press [0] [*] .
6) Press [*] [1] [3] [2] [*] [1] [*], then adjust VR405 (on the display PCB) to obtain 4.00 ± 0.20 V.
7) Press [0] [*] .
8) Press [*] [1] [3] [3] [*] [1] [*], then adjust VR401 (on the display PCB) to obtain 4.00 ± 0.20 V.
9) Press [0] [*] .
10 Press [*] [1] [3] [4] [*] [1] [*], then adjust VR407 (on the dispaly PCB) to obtain 4.00 ± 0.20 V.
11) Press [0] [*] .
12) Press [*] [1] [3] [5] [*] [1] [*]. The machine will run for about 3.5 minutes.
13) Press [C] twice.
14) Press [*] [4] [*] .
15) Press the following set of keys in succession and read the voltage. If the voltage for each is not within 4.00 ± 0.20 V, do steps 18) and after.

Address	Developing unit
[*] [2] [5] [0] [*]	M
[*] [2] [5] [1] [*]	C
[*] [2] [5] [2] [*]	Y
[*] [2] [5] [3] [*]	BK

Table 7-3

16) Select the following addresses successively by pressing [*] [Digit] [Digit] [Digit] [*] and write on the label the value indicated for each address. ("L" appears on the first display; it is not keyed in.)

DATE	, ,	, ,	, ,	, ,
ADDRESS	INIT			
L240				
L241				
L242				
L243				
L244				
L245				
L246				
L247				

Table 7-4

Note:
The label is attached to the inside surface of the hopper front cover.

17) Check that values indicated for addresses L244 through L247 are above 0.40 V. If not, check if the optical fiber is broken.
18) After checking all addresses, press [C] twice.
19) Press [*] [4] [*] .
20) Readjust the VR for any developing unit for which the indicated value was outside the range 4.00 ± 0.20 V.
M developer --- Repeat steps 4) and 5).
C developer --- Repeat steps 6) and 7).
Y developer --- Repeat steps 8) and 9).
BK developer --- Repeat steps 10) and 11).
21) Repeat steps 12) and after.

b. Adjusting the toner concentration sensing circuit of a developing unit.
Make this adjustment when a developing unit is replaced or parts inside one are replaced.

1) Put start developer in the developing unit(s), then install the unit(s) in the copier.
2) Press [*] [4] [*], then [*] [1] [3] [0] [*] (display PCB).
3) Press [1] [*] .
The machine will run for about 3.5 minutes to stir the start developer. (The machine will stop automatically after stirring.)
4) Press [*] [4] [*], then press the keys for the address of the unit to be checked.

Developing unit	Address
M	⊛131⊛
C	⊛132⊛
Y	⊛133⊛
BK	⊛134⊛

Table 7-5

5) Press 1⊛ . Adjust the VR for the developing unit selected above to obtain 4.00 ± 0.20 V.

Developing unit	Adjustment VR
M	VR403
C	VR405
Y	VR401
BK	VR407

Table 7-6

6) Press the keys for the address (Table 7-7) of the desired developing unit.

Developing unit	Address
M	⊛136⊛
C	⊛137⊛
Y	⊛140⊛
BK	⊛141⊛

Table 7-7

7) Press 1⊛ . The machine will run for about 3.5 minutes. (If toner is also to be changed in another developing unit, return to step 4).
8) Press C twice.
9) Press ⊛1⊛ .
10) Press keys for the address (Table 7-8) of the desired developing unit. If the voltage is not within the range 4.00 ± 0.20 V, repeat step 4) and after.
11) Select the following addresses successively by pressing ⊛ Digit Digit Digit ⊛ and write on the label the value indicated for each address. ("L" appears on the first display; it is not keyed in.)

Developing unit	Address
M	⊛250⊛
C	⊛251⊛
Y	⊛252⊛
BK	⊛253⊛

Table 7-8

DATE	, ,	, ,	, ,	, ,
ADDRESS	INIT			
L240				
L241				
L242				
L243				
L244				
L245				
L246				
L247				

Table 7-9

Note:
The label is attached to the inside surface of the hopper front cover.

12) Check that the value indicated for addresses L244 through L247 are above 0.40 V.
If the indicated value is 0.40 V or less, replace the optical fiber and adjust the toner density sensing circuit again.
13) Press C twice.

4. Adjustment after replacing DC controller PCB

When the DC controller PCB is replaced, make the following adjustments.

1) Adjust the laser power.
2) Press [*][3][*] (SERVICE mode)
3) Select the following addresses. With the [+/−] key, enter the values (L240 to L247) noted on the label during adjustment of the toner concentration sensor circuit.

Address	Value	Tolerance
U150	Enter the value of L240.	±0.01
U151	Enter the value of L241.	
U152	Enter the value of L242.	
U153	Enter the value of L243.	
U154	Enter the value of L244.	
U155	Enter the value of L245.	
U156	Enter the value of L246.	
U157	Enter the value of L247.	

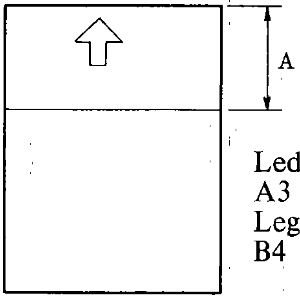
Table 7-10

- Press the [*] key.
- Press the [+/−] key twice to increase the value by 0.02, then press the [*] key again.
- Press the [−/+] key twice with the [INV] key pressed to decrease the value by 0.02, then press the [*] key again.

4) Press the [C] key twice.
5) Press [*] [4] [*] [*] [1] [0] [6] [*] [1] [*] (SERVICE mode). Environment data will be written into RAM.
6) Press [*] [4] [*] [*] [1] [0] [1] [*] [1] [*] (SERVICE mode). This causes the drum surface potential to be adjusted.
7) Make one copy and check the image density.
   If the copy is too light or dark, make the required adjustments in the following SERVICE modes.
   If the copy is light:
   [*] [4] [*] [*] [1] [0] [5] [*]
   If the copy is dark:
   [*] [4] [*] [*] [1] [0] [4] [*]
   Each time the [1] and [*] keys are pressed, the density increases or decreases by one step. The density can be adjusted in up to five steps.
8) Press the [C] key twice.

4-1. Operations in the U103/U104 SERVICE MODES

If lines appear in cross-feed direction in the area shown by the Figure , during continuous copying, make adjustment according to the procedure given below.



Ledger : Approx. 180 mm
A3 : Approx. 168 mm
Legal : Approx. 103 mm
B4 : Approx. 113 mm

1) Select U103 SERVICE mode by pressing [*] [3] [*] [*] [1] [0] [3] [*] keys.
2) To change the transfer corona emission condition by one step, press [*] [+/−] [+/−] [*] keys.
   [U][ ][2][2]
   └Transfer corona emission condition

Note:
Transfer condition should always be changed step by step. Making too large a change at one time can cause poor image transfer.

3) Make three copies to confirm whether lines in cross-feed direction have disappeared. If not, go over procedure 2).
4) Even in case lines in cross-feed direction are gone, image fault of blank area at about 50 mm from the trailing edge can rarely occur. If this problem is exhibited, select U104 and change the information on display by one step.
   [*] [3] [*] [*] [1] [0] [4] [*]
   [*] [+/−] [+/−] [*]
5) Make one copy and confirm that lines in cross-feed direction and blank areas are not present.

5. Checking the drum surface potential controller

a. General information

When images become faulty, it is necessary to first determine whether the cause of the problem is the latent image system (including the photosensitive drum and the drum surface potential controller) or in the developing and transfer systems. To do this, check the drum surface potential.

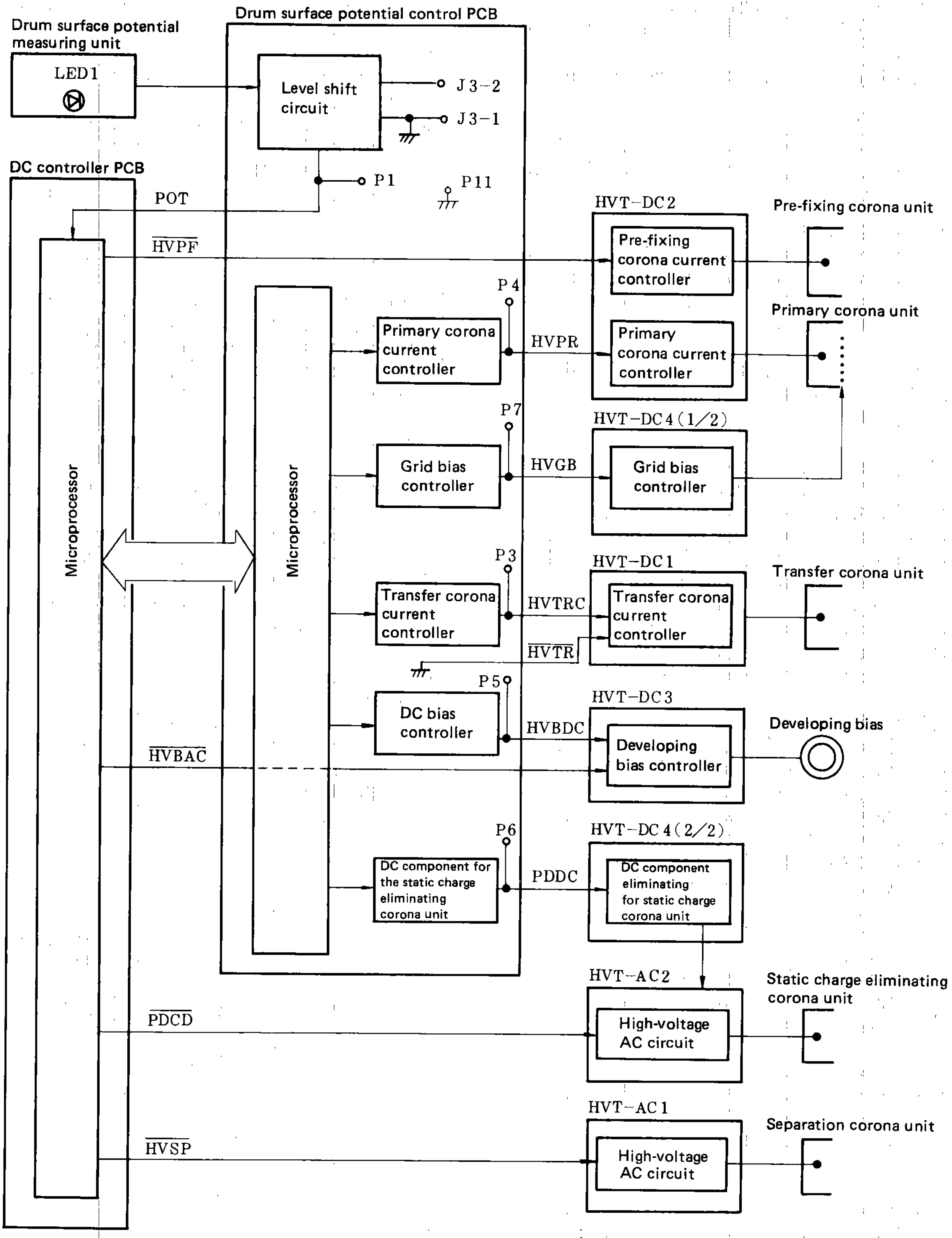

Drum surface potential measuring unit
LED1
Drum surface potential control PCB
Level shift circuit
J3-2
J3-1
P1
P11
DC controller PCB
POT
HVPF
Microprocessor
Microprocessor
P4
Primary corona current controller
HVPR
P7
Grid bias controller
HVGB
P3
Transfer corona current controller
HVTRC
HVTR
P5
DC bias controller
HVBDC
HVBAC
P6
DC component for the static charge eliminating corona unit
PDDC
PDCD
HVSP
HVT-DC2
Pre-fixing corona current controller
Primary corona current controller
HVT-DC4(1/2)
Grid bias controller
HVT-DC1
Transfer corona current controller
HVT-DC3
Developing bias controller
HVT-DC4(2/2)
DC component eliminating for static charge corona unit
HVT-AC2
High-voltage AC circuit
HVT-AC1
High-voltage AC circuit
Pre-fixing corona unit
Primary corona unit
Transfer corona unit
Developing bias
Static charge eliminating corona unit
Separation corona unit

Figure 7-7

b. Cancelling the automatic setting of the target contrast potential

To check whether the grid bias and the developing bias is correct, cancel the automatic setting of the target contrast and manually the target contrast potential.

a) Cancelling procedure

1) Press $\boxed{*}\boxed{3}\boxed{*}\boxed{*}\boxed{1}\boxed{0}\boxed{1}\boxed{*}$ (display PCB).
2) Press $\boxed{*}\boxed{+/-}\boxed{+/-}\boxed{*}$. The display will show 1.
3) Press $\boxed{*}$. This enables setting the target contrast manually.
4) Press $\boxed{C}$ twice.
5) Press the key immediately below each 1-segment display on the display PCB to change the indication of each to 3.

Reference information:
When 3 is entered, the drum surface potential will subsequently be adjusted for medium target contrast potential. If 4 or 5 is set, the target contrast potential is increased.

6) Press $\boxed{*}\boxed{4}\boxed{*}\boxed{*}\boxed{1}\boxed{0}\boxed{0}\boxed{*}\boxed{1}\boxed{*}$. The drum surface potential will be adjusted.
7) Press $\boxed{C}$ twice.

b) Using the target contrast potential manual setting if images become faulty, manually set the target contrast potential to determine whether the cause of the problem lies in the microprocessor of the DC controller PCB or the environment sensor.
If copy images are somewhat improved after the contrast potential is set manually, the environment sensor or the environment sensor PCB may be defective.

Reference information:
Whether the drum surface potential controller is normal cannot be determined when the target contrast potential is set manually. This is because the target contrast potential is set by the microprocessor of the DC controller PCB, while the potential (V_D and V_L) on the photosensitive drum is measured by the drum surface potential controller PCB.

c. Zero-level check

The zero-level check is a method to determine whether the drum surface potential controller PCB is functioning normally.

Reference information:
The zero-level check determines whether the microprocessor of the DC controller PCB correctly senses that the drum surface potential is 0 V.

The zero-level check helps determine whether the microprocessors of the DC controller PCB and of the measuring unit are functioning normal.

The zero-level check can be performed by two methods.

Method 1 judges whether the level shift circuit of the drum surface potential controller PCB is functioning normally. Method 2 judges whether the drum surface potential measuring circuit is functioning normally.

a) Method 1

1) Set the power switch OFF.
2) Remove the rear panel and move the upper cover to the right.
3) Disconnect connector J4 from the drum surface potential measuring PCB.
4) Short J3-1 and J3-2 on the drum surface potential controller PCB with a jumper wire.
5) Insert a door switch actuating tool into the door switch and set the power switch ON.
6) Press $\boxed{*}\boxed{1}\boxed{*}\boxed{*}\boxed{2}\boxed{1}\boxed{4}\boxed{*}$. The 7-segment displays will show the drum surface potential.

If the reading is not 0 ± 30 V, measure the voltage between P1 (+) and P11 (−) on the drum surface potential controller PCB. If this is not 1 ± 0.1 V, the drum surface potential controller PCB may be defective.

8) Set the power switch OFF and remove the door switch actuating tool.
9) Remove the jumper wire from the drum surface potential controller PCB.
10) Reconnect J4.
11) Install the upper cover and the rear panel.
12) Set the power switch ON.

b) Method 2

1. Making the measurement

1) Set the power switch OFF.
2) Remove the photosensitive drum.
3) Attach the potential sensor test electrode (TKN-0197) to the drum surface potential sensor.

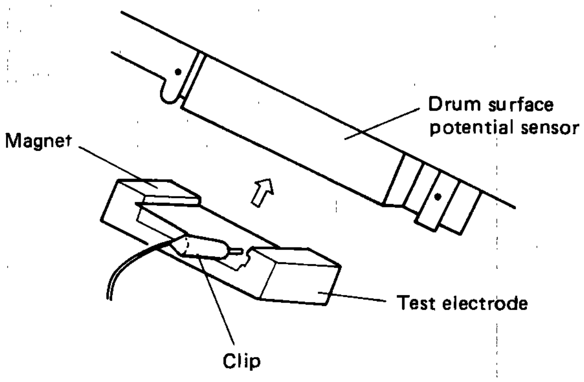


Figure 7-8

Note:
When attaching the test electrode to the drum surface potential sensor, be careful that the magnet of the electrode does not touch the potential sensor mount.

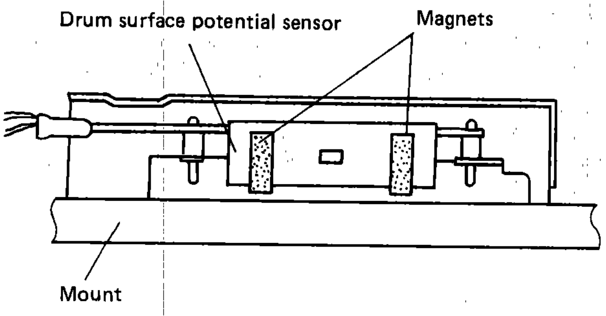


Figure 7-9

4) Clip a jumper wire to the electrode.

Note:
Be absolutely sure not to touch the sensor cover with the clip. Connect it to the electrode a good distance away from the sensor window.

5) Connect the other end of the jumper wire to P11 on the drum surface potential controller PCB.
6) Insert the door switch actuating tool into the door switch.
7) Set the power switch ON.

Caution:
Do not touch the drum surface potential sensor while the power switch is ON.

8) Press ⊠1⊠ ⊠214⊠ . The 7-segment displays will show the drum surface potential.
   The normal reading is 0 ± 30 V.
9) Interpret the measurements.
   1. If the result of method 1 is acceptable and that of method 2 is not, either the sensor is dirty or the drum surface potential measuring unit is defective.
   2. If the results of method 1 and method 2 are both acceptable, the signal routes from the drum surface potential sensor unit to the microprocessor of the DC controller PCB and their operations are normal.
10) Set the power switch OFF.
11) Remove the potential sensor test electrode.
12) Install the drum.
13) Set the power switch ON.

d. Checking the environment sensor PCB

As described below, use the environment measuring PCB test PCB (TKN-0457) and the environment sensor calibration PCB (TKN-0456) to check whether the environment sensor PCB and the environment sensor are functioning normally.

a) Checking the environment measuring PCB
1) Set the power switch OFF.
2) Remove the hopper front cover.
3) Remove the environment sensor from the environment measuring PCB . Plug in the enviroment measuring PCB test PCB (TKN-0457) in its place.
4) Set the power switch ON.
5) Set the multimeter to the 30 VDC range. Measure the voltage between J1-1(+) and J1-2(−) on the environment measuring PCB. If it is not 26 ± 4 V, check the DC power supply PCB (PU2).
6) Press ⊠1⊠ .
7) Select the following addresses in turn and read the 7-segment displays.
   ⊠215⊠ --- Satisfactory: 25±5
   ⊠216⊠ --- Satisfactory: 40±10
8) If the displayed values are not within tolerance, do step 9) and after.
   If the values are within tolerance, go to step 14).
9) Press C twice, then set the power switch OFF.
10) Disconnect connector J1 from the environment measuring PCB.
11) Set the power switch ON. Press ⊠1⊠ .
12) Select the following addresses in turn and read the 7-segment displays.
   ⊠215⊠ --- Satisfactory: 25±5
   ⊠216⊠ --- Satisfactory: 36±10
13) If the displayed values are out of tolerance, the DC controller PCB may be defective.
14) Press C twice.
15) Set the power switch OFF.
16) Connect connector J1 to the environment measuring PCB.
17) Disconnect the environment measuring PCB test PCB from the environment measuring PCB and reinstall the environment sensor.
18) Install all covers.

b) Checking the environment sensor
1) Check the environment measuring PCB (as described above).
2) Set the power switch ON and wait five minutes.
3) Press ⊠1⊠ (Display mode).
4) Select the following addresses in turn and write down the numbers displayed. (data B)
   ⊠215⊠ (data A1)
   ⊠216⊠ (data A2)
5) Press C twice, then set the power switch OFF.
6) Remove the environment sensor from the environment measuring PCB. Plug in the environment sensor calibration PCB (TKN-0456) in its place.
7) Set the power switch ON and wait five minutes.
8) Press ⊠1⊠ .
9) Select the following addresses in turn and write down the values displayed. (data B)
   ⊠215⊠ (data B1)
   ⊠216⊠ (data B2)
10) Compare data A with data B.
- Allowable difference between data A1 and data B1: 0±5.
- Allowable difference between data A2 and data B2: 0±20.

If the difference of either is out of tolerance, replace the environment sensor.

11) Press C twice, then set the power switch OFF.
12) Remove the environment sensor calibration PCB from the environment measuring PCB and reinstall the environment sensor.
13) Install all covers.

Note:
The environment sensor calibration PCB (TKN-0456) is precisely adjusted at the factory. Store it in its sealed container with the drying agent. Re-activate the drying agent on a regular basis by heating the package of drying agent to about 150°C in an oven for an hour or more.

e. Checking circuits of the drum surface potential controller

a) Drum surface potential measuring system

Block	Check point	Normal	main cause
Drum surface potential measuring unit	LED1 (on the drum surface potential measuring PCB)	ON during coying	Drum surface potential measuring unit, high voltage transformer (HVT-DC3)
Drum surface potential controller	Zero-level check	The results of zero-level check method 1 and method 2 are within the range 0±30 V.	1. When the result of method 1 is out of tolerance, the drum surface potential controller PCB or the DC controller PCB is defective. 2. When the result of method 2 is out of tolerance, the drum surface potential measuring unit or the high voltage transformer (HVT-CD3) is defective.

b) Drum surface potential controller output system

Press ✱ 4 ✱ , then select the following addresses in turn and make the test shown in the "Check" column.

System	Check	Normal	main Mause
Primary corona output system	Voltage between P4 and P11 (GND) on the drum surface potential controller PCB (PRIMARY CORONA CONTROL signal)	Approx. 10.9 V	Defective DC controller PCB or drum surface potential controller PCB
	LED 1 (high-voltage transformer HVT-DC2 output)	LED ON.	Defective HVT-DC2, high-voltage cable, or primary corona.

System	Check	Normal	Main cause
Grid bias output system *160*1*	Voltage between P7 and P11 (GND) on the drum surface potential controller PCB (grid bias control signal)	Approx. 11.56 V	Defective DC controller PCB or drum surface potential controller PCB
	Voltage between J2 and J1-1 on high voltage transformer HVT-DC4 (HVT output voltage)	Approx. −500 V	Defective HVT-DC4, highi-voltage cord, or primary corona assembly.
Transfer corona output system *167*1*	Voltage between P3 and P11 (GND) on the drum surface potential controller PCB (transfer corona control signal)	Approx. 17 V	Defective DC controller PCB or drum surface potential controller PCB
	LED 2 (transfer corona control signal high-voltage transformer HVT-DC1)	LED ON	Defective DC controller PCB or drum surface potential controller PCB
	LED 4 (high-voltage transformer HVT-DC1 output)	LED ON	Defective HVT-DC1, highi-voltage cord, or transfer corona assembly
Separation corona output system *164*1*	Voltage between J101-14B and J111-2 (GND) on the DC controller PCB (separation corona drive command)	Approx 0 V	Defective DC controller PCB
AC output system for the static charge eliminating corona *165*1*	Voltage between J101-13B and J111-2 (GND) on the DC controller PCB (static charge eliminating corona drive command)	Approx. 0 V	Defective DC controller PCB
DC output system for the static charge eliminating corona *163*1*	Voltage between P6 and P11 (GND) on the drum surface potential controller PCB (DC static charge eliminating corona drive command)	Approx. 10.67 V	Defective DC controller PCB or drum surface potential controller PCB
Pre-fixing corona output system *166*1*	Voltage between J5-7 and J5-6 (+24 V) on the drum surface potential controller PCB (pre-fixing corona output command)	Approx. 0 V	Defective DC controller PCB or drum surface potential controller PCB
Developing bias DC output system *161*1*	Voltage between J5 and J11 (GND) on the drum surface potential controller PCB (developing bias control signal)	Approx. 10.29 V	Defective DC controller PCB or drum surface potential controller PCB
Developing bias AC output system *162*1*	Voltage between J6-3 and J6-2 (+24 V) on the drum surface potential controller PCB (developing bias AC control signal)	Approx. 0 V	Defective DC controller PCB or drum surface potential controller PCB

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1</td><td>Press [*] [4] [*] [*] [2] [0] [6] [*] [1] [*]
(Automatic drum surface potential adjusment is cancelled.)
Make a copy. Is the image improved?</td><td>NO</td><td>Go to step 7).</td></tr>
<tr><td>Drum surface potential measuring system</td><td>2</td><td>Do the zero-level check described on p. 7-12. Is the result normal?</td><td>NO</td><td>Check the drum surface potential measuring unit, drum surface potential controller PCB and DC controller PCB.</td></tr>
<tr><td></td><td>3</td><td>Press [*] [4] [*] [*] [1] [0] [1] [*] [1] [*]
(The drum surface potential is adjusted.)
Press [*] [1] [*] , then select the following addresses in turn and read the 7-segment displays. (“L” is shown on the first display, and is not keyed in.)
<table>
<tr><th>Address</th><th>Data</th></tr>
<tr><td>L210</td><td>V_D1</td></tr>
<tr><td>L211</td><td>V_L1</td></tr>
<tr><td>L212</td><td>V_D2</td></tr>
<tr><td>L213</td><td>V_L2</td></tr>
<tr><td>L274</td><td>V_D3</td></tr>
<tr><td>L275</td><td>V_L3</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Primary corona and grid bias output system</td><td>4</td><td>Is the value for V_{D1} approx. 300, for V_{D2} approx. 500 or 600, and for V_{D3} approx. 800?</td><td>NO</td><td>Check the primary corona and grid bias output system.</td></tr>
<tr><td>Laser output system</td><td>5</td><td>Is V_{L1} approx. 100, and V_{L2} approx. 150?</td><td>NO</td><td>Check the laser output system.</td></tr>
<tr><td>Environment sensor</td><td>6</td><td>Press the keys below the 7-segment displays to set each display to 3.
Press [*] [3] [*] [*] [1] [0] [1] [*] [*] [+/−] [+/−] [*]
(Manual adjustment of target contrast becomes possible.)
Switch the power OFF, then ON. Make several copies. Are images improved?</td><td>YES</td><td>Check the environment sensor.</td></tr>
<tr><td>Developing bias controller PCB</td><td>7</td><td>Check the developing bias as described on p. 7-15. Is the result normal?</td><td>NO</td><td>Check the developing units, HVT, drum surface potential PCB, and DC controller PCB.</td></tr>
<tr><td>Grid bias controller PCB</td><td>8</td><td>Check the grid bias as described on p. 7-15. Is the result normal?</td><td>NO</td><td>Check the primary corona unit, HVT, drum surface potential controller PCB, and DC controller PCB.</td></tr>
<tr><td>Photosensitive drum</td><td></td><td></td><td>YES</td><td>Replace the photosensitive drum</td></tr>
</table>

6. Checking photointerrupters

Photointerrupters in the printer may be checked with a multimeter or using the SERVICE mode.

(1) Multimeter
1) Set the multimeter to the 12 VDC range.
2) Connect the negative (−) probe to J110-2 (GND) on the DC controller PCB.
3) Connect the positive (+) probe successively to the terminals listed in the table below.
4) Check photointerrupters according to the check procedure.

(2) SERVICE mode
1) Open the front door and remove the front middle cover. Insert the door switch actuating tool into the door switch.
2) Press $\boxed{*}\boxed{1}\boxed{*}$.
3) Press the keys as instructed in "Key input", in the table below.
4) Check photointerrupters as described in the check procedure.

No.	Q4	Q5	Q6	Q7
Function	Delivery unit paper sensor ($\overline{PDP5}$)	Manual feed unit paper sensor (MFS)	Upper cassette paper sensor ($\overline{UPEP}$)	Lower cassette paper sensor ($\overline{LPEP}$)
Positive (+) probe (Multimeter)	J101-8B	J101-5B	J101-1B	J101-2B
Key input (Display mode)	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{7}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{6}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{0}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{1}\rightarrow\boxed{*}$
Check procedure (Photointerrupters are functioning normally when the result to the right is obtained.) Refer to Note 1.	Open and close the delivery unit door (in STANDBY). · Door open --- 0 · Door closed --- 1	Raise and lower the manual feed switching lever in machine standby. · When the manual feed mode is selected --- 1 · When the cassette is selected --- 0	Raise and lower the detection lever in machine standby. · When the lever is raised --- 1 · When the lever is lowered --- 0	Raise and lower the detection lever in machine standby. · When the lever is raised --- 1 · When the lever is lowered --- 0

No.	Q8	Q9	Q10	Q11
Function	Upper cassette lifter position sensor (ULFTP)	Lower cassette lifter position sensor (LLFTP)	Feed roller paper sensor (PDP1)	Registration roller paper sensor (PDP2)
Positive (+) probe (Multimeter)	J101-3B	J101-4B	J101-10A	J101-11A
Key input (Display mode)	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{4}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{5}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{2}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{6}\rightarrow\boxed{3}\rightarrow\boxed{*}$
Check procedure (Photointerrupters are functioning normally when the result to the right is obtained.) Refer to Note 1.	Raise and lower the sensor arm (in STANDBY). · Arm raised --- 1 ·Arm lowered --- 0	Raise and lower the sensor arm (in STANDBY) · Arm raised --- 1 · Arm lowered --- 0	Raise and lower the sensor arm (in STANDBY) · Arm raised --- 1 · Arm lowered --- 0	Insert copy paper into the Q11 unit (in STANDBY). · Paper at Q11 --- 1 · Paper not at Q11 --- 0

No.	Q12	Q13	Q14	Q15
Function	Turret lock release sensor ($\overline{\text{RLR}}$)	Turret home position sensor (RHP)	Image leading edge sensor ($\overline{\text{ILEG}}$)	Transfer drum home position sensor ($\overline{\text{TDHP}}$)
Positive (+) probe (Multimeter)	J102-8B	J114-4	J104-2B	J104-3B
Key input (Display mode)	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{4}\rightarrow\boxed{1}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{4}\rightarrow\boxed{0}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{7}\rightarrow\boxed{3}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{7}\rightarrow\boxed{2}\rightarrow\boxed{*}$
Check procedure (Photointerrupters are functioning normally when the result to the right is obtained.) Refer to Note 1.	Raise and lower the lock lever (in STANDBY). · Lever raised --- 1 (unlocked) · Lever lowered --- 0 (locked)	Turn the turret (in STANDBY). · Turret at home position --- 1 · Turret not at home position --- 0	Turn the transfer drum (in STANDBY). · Light blocking plate at Q15 --- 0 · Light blocking plate not at Q15 --- 1	Turn the transfer drum (in STANDBY) · Light blocking plate at Q16 --- 0 · Light blocking plate not at Q16 --- 1

No.	Q17	Q18	Q19	Q25
Function	Separation unit paper sensor (PDP4)	Transfer drum paper sensor (PDP3)	OHP film sensor ($\overline{\text{OHPDP}}$)	Remaining cleaning belt sensor ($\overline{\text{CBOUT}}$)
Positive (+) probe (Multimeter)	J104-6B	J104-7B	J101-9A	J101-15B
Key input (Display mode)	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{7}\rightarrow\boxed{4}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{7}\rightarrow\boxed{5}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{7}\rightarrow\boxed{7}\rightarrow\boxed{*}$	$\boxed{*}\rightarrow\boxed{1}\rightarrow\boxed{4}\rightarrow\boxed{4}\rightarrow\boxed{*}$
Check procedure (Photointerrupters are functioning normally when the result to the right is obtained.) Refer to Note 1.	Feed paper into Q17 (in STANDBY). · Paper at Q17 --- 1 · Paper not at Q17 --- 0	Feed paper into Q18 (in STANDBY) · Paper at Q18 --- 1 · Paper not at Q18 --- 0	Feed paper into Q19 (in STANDBY) · Paper at Q19 --- 1 · Paper not at Q19 --- 0	Raise and lower the sensor arm (in STANDBY) · Arm raised --- 1 · Arm lowered --- 0

Note:
In "Check procedure", 1 and 0 mean the following.
When a multimeter is being used --- 1 is approx. 5 V, and 0 is approx. 0 V.
When the DISPLAY mode is being used --- 1 and 0 are shown on the display PC board

III. IMAGE TROUBLESHOOTING

A. Initial Inspection

1. Installation
   a. The line voltage should be within ±10 V of the voltage marked on the rating plate.
   b. Avoid very hot and humid locations (near faucets, humidifiers, etc.); avoid cold or dusty locations, and places exposed to open flame.
   c. Do not expose the machine to ammonia gas.
   d. Avoid direct sunlight. If the machine must be installed near a sunny window, strongly recommend to the client that he install blinds or curtains.
   e. Install the machine in a well-ventilated room.
   f. Install the machine on a level floor.
   g. Keep the machine plugged in at night.
   Check that the environment satisfies the above requirements.

2. Check the document.
   Check whether the original is the cause of the trouble.
   Example:
   When the original is on tracing paper or translucent sheet ...... The image may be fogged.
   When the original is inlight pencil ...... The image may be light.

3. Check whether the copyboard cover, copyboard glass, or standard white plate are marked or scratched.
   Remove all marks with a moist cloth. Replace any part that is scratched.

4. Check the corona units.
   a. Check that each corona unit is clean and that the corona wire is not scratched.
   b. Wipe the corona wire in each corona assembly with dry lint-free paper, then clean it with alcohol. Clean the shield plates with a moist cloth. (Replace the part if marks cannot be removed.)
   c. Check the height of the corona wires.
   d. Check that the corona units are installed securely.
   e. Check corona wire springs (particularly the pre-transfer and separation corona units) for rust.

5. Check the developing assembly.
   a. Check that the rollers at both sides of the developing assembly are in contact with the drum.
   b. Check that the developing cylinder is evenly covered with toner.
6. Check copy paper.
   a. Is Canon-approved paper being used?
   b. Has the paper absorbed water?
   Make copies with fresh, dry paper from a new package.
7. Check the periodically replaced parts.
   a. Replace all parts that have already passed their service lives (refer to the periodic service list).

8. Others
   If the machine is moved from a cold storage area directly into a warm room, condensation may form inside the machine and cause various problems.
   a. Condensation in the laser scanner unit (glass, mirror, lens, etc.) causes light images.
   b. Condensation in corona units causes current leakage.
   c. Condensation on the paper pick-up unit guide and the paper feed guide causes poor paper feed.
   If condensation is observed, plug the machine in for 10 to 20 minutes.

> If a difference in density (between the leading and trailing edges of the copy), light images, or fogged images are observed, first make the adjustments of "Basic image adjustment procedure".

B. Standard Image

Make full-color (four-color) copies with the CANON CA-1 test sheet. Standard-image copies should satisfy the following conditions of the gray scale, color patches, and three-color gradation scale (which are on the test sheet).

1. Gray scale

   No. 1 (dark area) should be almost completely solid. The image should become lighter as the scale numbers increase. No. 8 of the light area should be barely visible. No. 9 should be blank.

   Halftones should be almost gray, not yellow, red, or blue.
2. Color patches

   Colors should be distinguishable from each other. Colors on the copy should not be much different from those on the test sheet.
3. Photograph

   The color balance on the copy should not be much different from that on the original photograph.
4. Three-color gradation scale

   All three colors should be close to the primary colors. The image density should decrease as the scale numbers increase. No. 8 should be barely visible, and No. 9 should be blank.
5. Halftone stripe

   Colors of the stripe on the copy should not be much different from those on the test sheet. The image should be even along the entire length of the stripe. Colors near the right and left edges should not differ very much.
6. Fogging

   The white area of the test sheet should not be fogged.

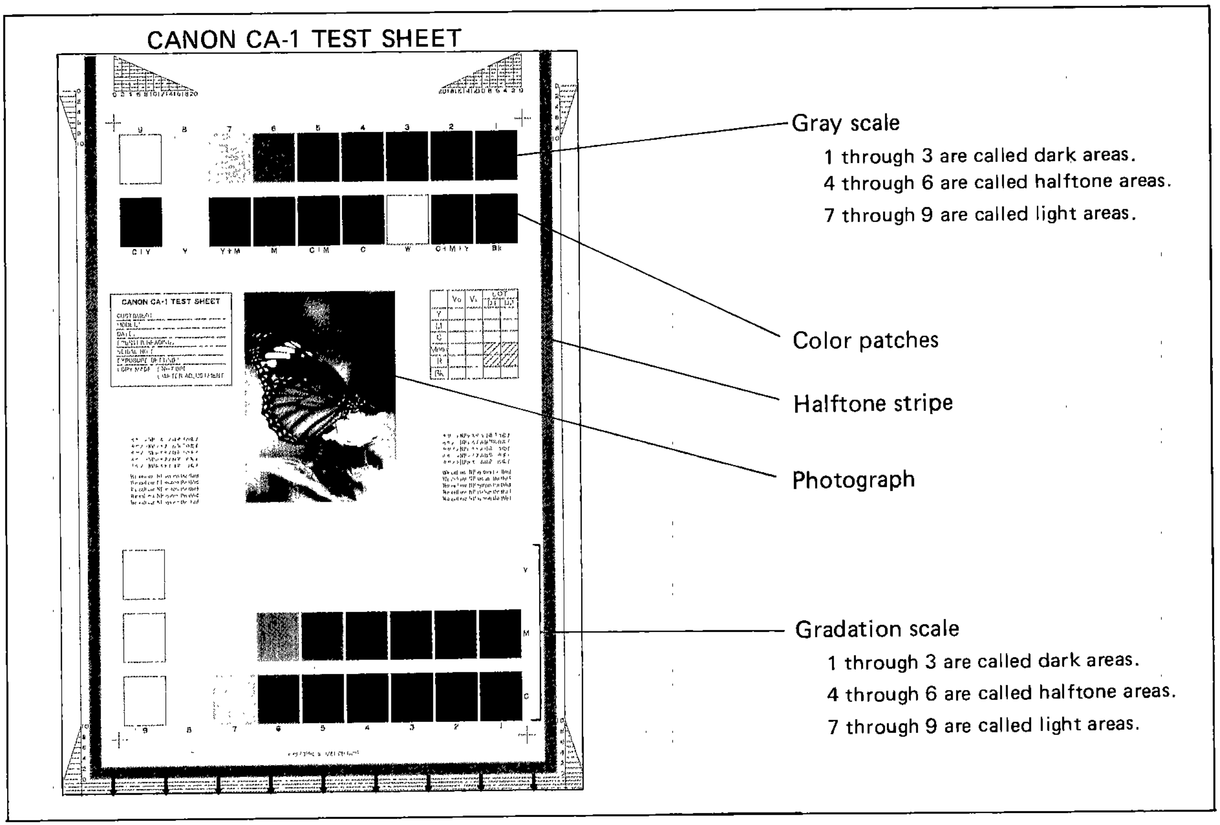
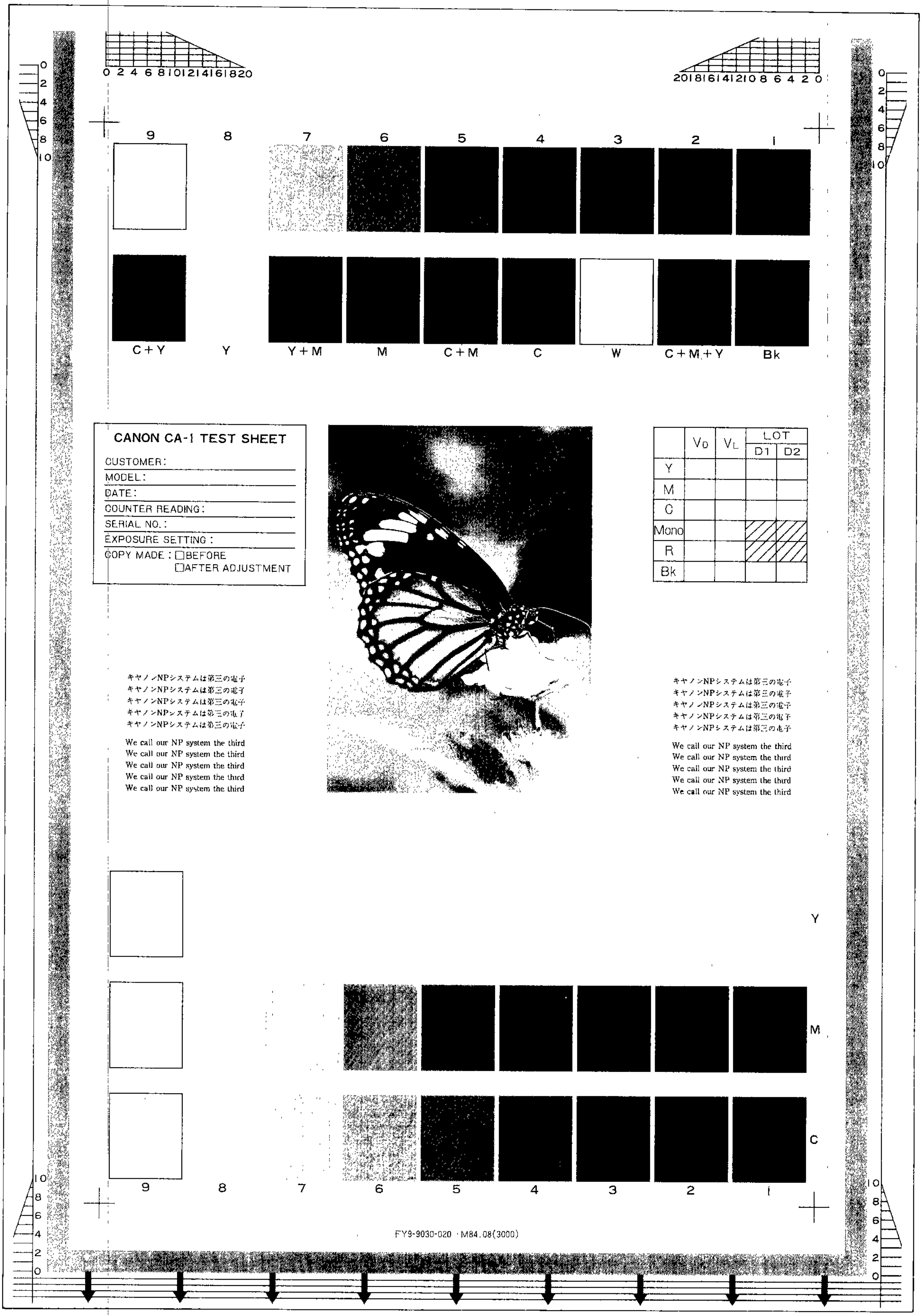

CANON CA-1 TEST SHEET
Gray scale
1 through 3 are called dark areas.
4 through 6 are called halftone areas.
7 through 9 are called light areas.
Color patches
Halftone stripe
Photograph
Gradation scale
1 through 3 are called dark areas.
4 through 6 are called halftone areas.
7 through 9 are called light areas.

Figure 7-10


0 2 4 6 8 10 12 14 16 18 20
20 18 16 14 12 10 8 6 4 2 0
0
2
4
6
8
10
9
8
7
6
5
4
3
2
1
C+Y
Y
Y+M
M
C+M
C
W
C+M+Y
Bk
Y
M
C
FY9-9030-020 · M84.08(3000)

CANON CA-1 TEST SHEET

CUSTOMER:
MODEL:
DATE:
COUNTER READING:
SERIAL NO.:
EXPOSURE SETTING:
COPY MADE: ☐BEFORE
☐AFTER ADJUSTMENT

	V_D	V_L	LOT	
			D1	D2
Y				
M				
C				
Mono			▨	▨
R			▨	▨
Bk				

キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子

We call our NP system the third
We call our NP system the third
We call our NP system the third
We call our NP system the third
We call our NP system the third

キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子
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キヤノンNPシステムは第三の電子
キヤノンNPシステムは第三の電子

We call our NP system the third
We call our NP system the third
We call our NP system the third
We call our NP system the third
We call our NP system the third

Figure 7-11 Standard Image Sample

C. Test Prints

The printer has four test print patterns. Each test pattern is used to judge image faults.

1. Selecting the test print pattern

The following is an example procedure for selecting 64-color test print 1.

1) Press $\boxed{*}\boxed{4}\boxed{*}$.
2) Press $\boxed{*}\boxed{2}\boxed{3}\boxed{0}\boxed{*}$. (This selects "64-color test print 1".
3) Press $\boxed{1}\boxed{*}$. (This registers "64-color test print 1"). Even if power has been switched OFF, 64-color test print 1 will always be produced as the test pattern.
4) Press $\boxed{C}$ twice. (This cancels the SERVICE mode). Press the TEST PRINT key to confirm that a 64-color test print is produced.

When making test prints, make copies using the cassette in the upper cassette holder.

2. Horizontal-stripe test print

Make horizontal-stripe test prints and check the dark-area density of each color and the balance between colors, and check for white stripes in the color areas.

a. Dark-area density of color and balance between colors

All colors on the horizontal-stripe test print should be reproduced at maximum density. The test print should not have areas of very low density.

If the image density of only one color is low, the developing unit for that color may be faulty.

If the image density of all colors is low, the laser system may be faulty.

b. White strips in areas of one color only

If white stripes appear, only in cyan images, for example, the cyan developing unit may be faulty.

c. Difference in density between right and left areas

When a difference in density between right and left areas is observed in all colors, the height of the primary or transfer corona wire may be incorrect.

d. Horizontal image position

If the cassette holder is positioned incorrectly, the horizontal position of the image on the copy becomes incorrect, resulting in an image too far to one side.

This may cause toner to scatter and soil the inside of the machine.

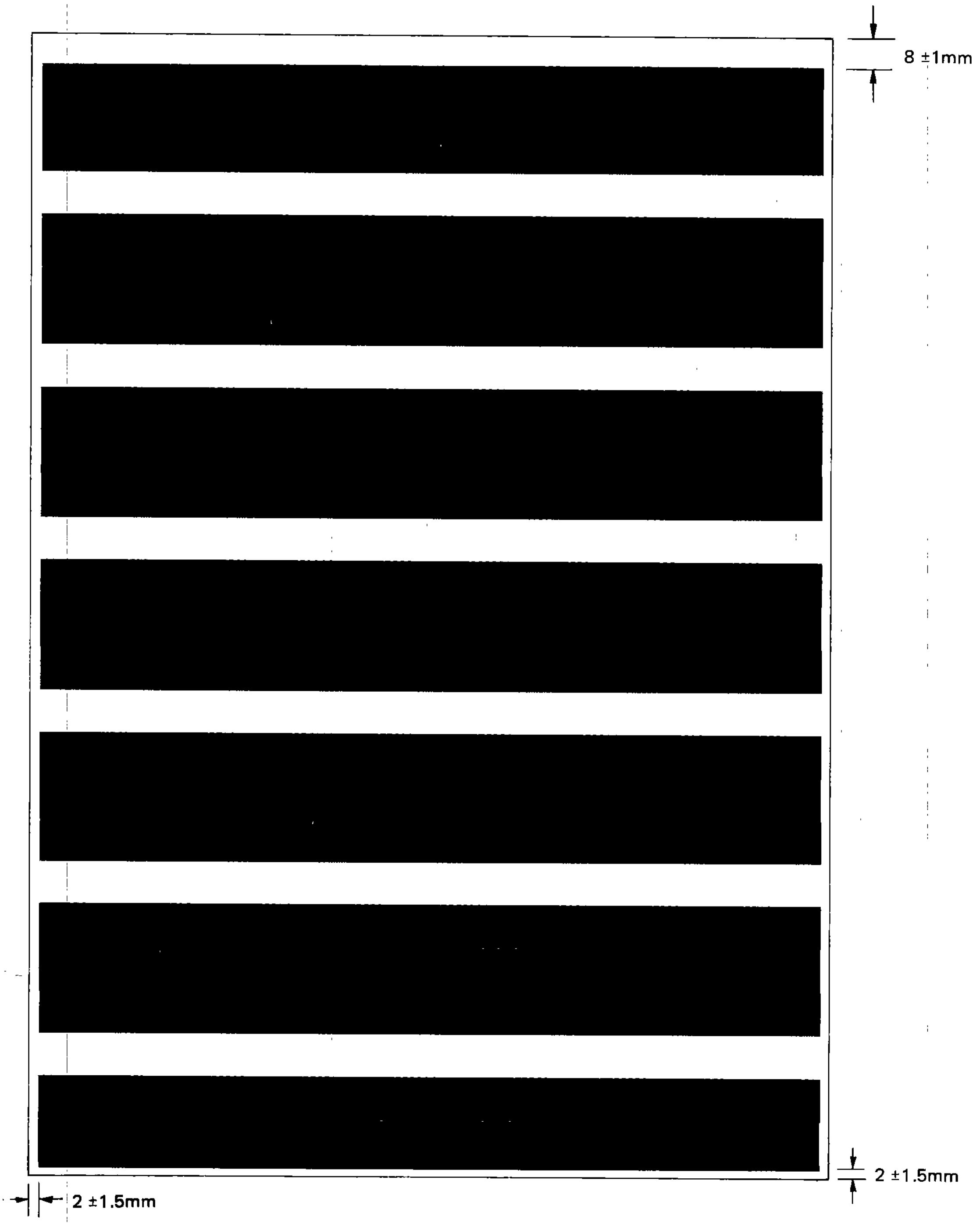


Figure 7-12

3. 16-gradation test print

Make a 16-gradation test print and check for tone reproduction, fogging, white strips, and difference in density between right and left areas.

a. Tone reproduction

If the density gradations shown in Figure 7-13 are not distinct, the laser system may be defective.

b. Fogging

The white area should not be fogged.

c. White stripe

If white strips appear on the image, the developing system may be defective.

d. Difference in density between right and left areas

If the image density differs between right and left areas, the developing roller may be scraped or the primary corona or transfer corona wire may be at an incorrect height.

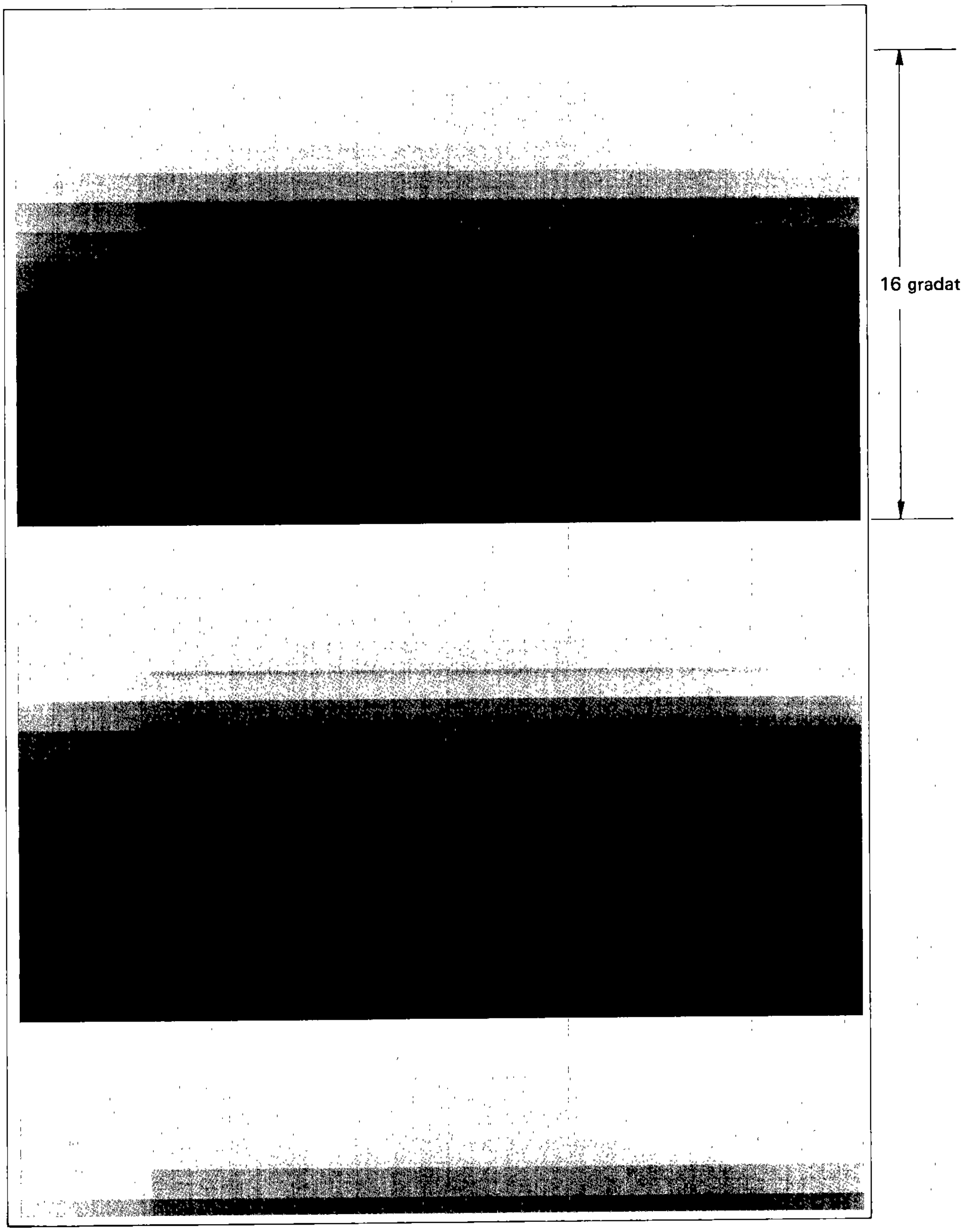


Figure 7-13

4. Halftone test print

Make a halftone test print and check for blank areas.

a. Blank areas

If there are blank areas, the transfer drum sheet or the static charge eliminating corona unit may be defective (poor transfer).

b. Black strips

If black strips appear, the photosensitive drum may be scratched or the primary corona wire may be dirty.

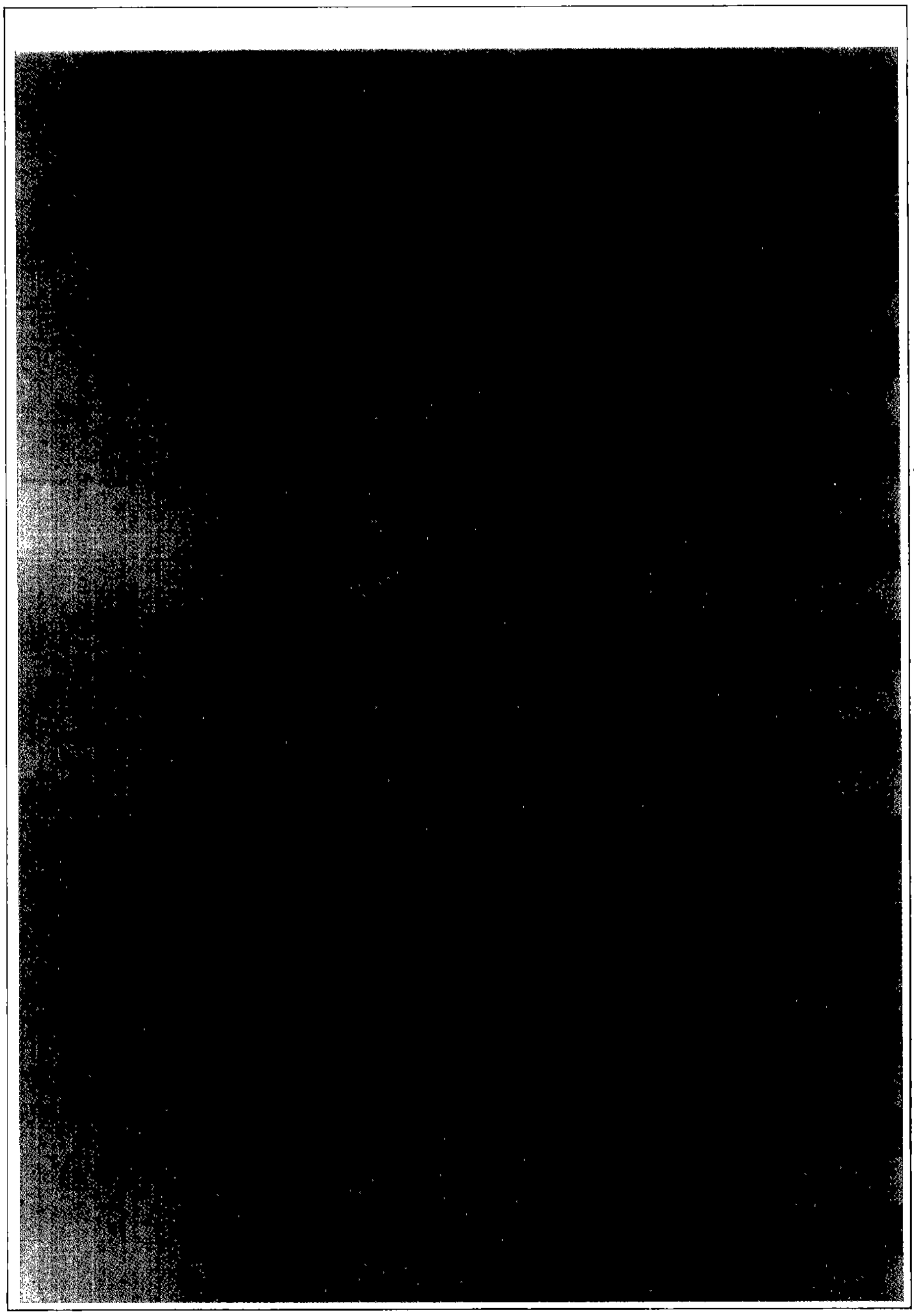


Figure 7-14

5. 64-color test print

Make a 64-color test print and check for color reproduction and fogging.

All 64 colors should be reproduced in the first four lines from the leading edge of the copy, and they should repeat regularly every four lines.

a. Reproduction of 64 colors

Colors should be reproduced as shown in Figure 7-15. If colors are different, the developer or the photosensitive drum may have deteriorated, or developer of different colors may be mixed.

b. Fogging

If only the white areas shown in Figure 7-15 are fogged, the laser may be adjusted incorrectly.

If the entire copy is fogged, the developing system or the photosensitive drum may be faulty.

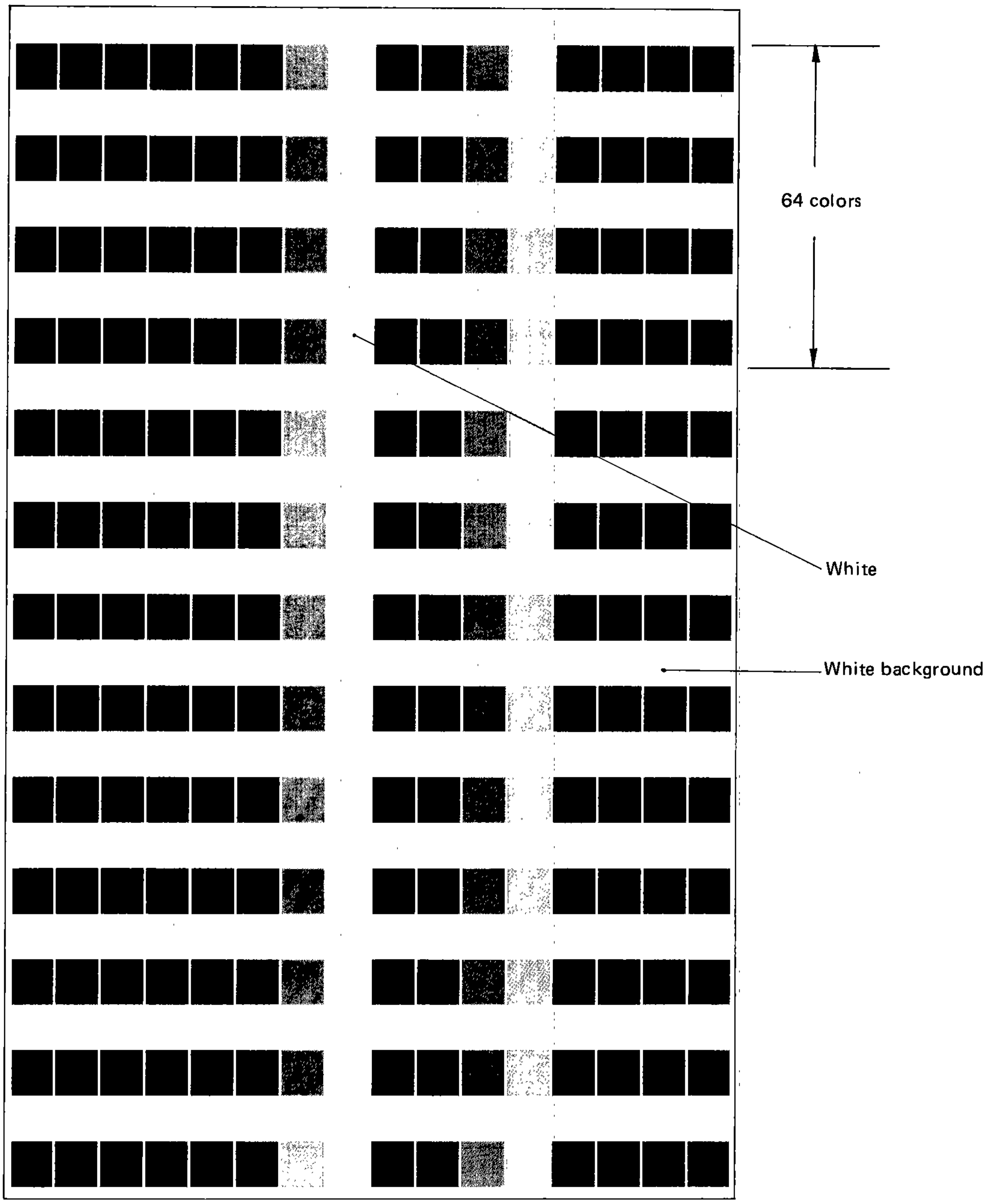


Figure 7-15

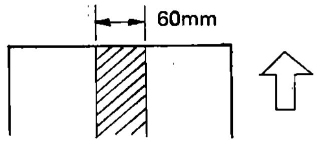
D. Troubleshooting by Faulty Image

1. Light image

Location/type of fault		Step	Check	Result	Measure
		1.	Are images of only one color light?	YES	Go to step 6.
		2.	Set the power switch OFF during a copying operation and open the front door. Check whether the toner image on the surface of the photosensitive drum (before transfer) is normal.	NO	Go to step 10.
Transfer	Transfer corona	3	Is the corona wire of the transfer corona unit installed correctly? Is the wire height correct? Is the corona unit pushed in securely?	NO	1. Reinstall the corona wire. 2. Adjust the height of the corona wire. 3. Clean the corona wire. 4. Push the corona unit in fully.
	Copy paper	4.	Do images become darker when copy paper from a new package is used?	YES	1. Paper may be have absorbed water. Advise the user of the correct way to store paper. 2. Explain to the user that images may be of slightly inferior quality when paper not approved by Canon is used.
High-voltage cable		5.	Is there continuity between the connectors of the high-voltage cable for the transfer corona unit?	NO	Replace the high-voltage cable.
High-voltage system				YES	Check the high-voltage cable.
Development	Developing unit	6.	Is the developing unit pushed in securely?	NO	Push the developing unit in fully.
	Developing cylinder	7.	Wipe the exposed part of the developing cylinder a few times with a dry cloth. Do images become lighter?	YES	Wipe the entire area of the developing cylinder with a dry cloth as clean as possible, then wipe it with a lint-free cloth moistened with water and squeezed tightly. Wait until the cylinder dries completely before using the machine.
	Toner concentration sensor unit	8.	Is there toner in the developing unit?	NO	Check the toner concentration sensor system.
	Developing unit position	9.	Are the roller of the developing unit pressing against the photosensitive drum?	NO	Reinstall the developing assembly.
	Developing bias contact plate			YES	Check if the developing bias contact plate of the developing unit is deformed.
Image Scanner		10.	Are 16-gradation test prints normal?	YES	Refer to Chapter 7 in the Image Scanner Service Manual.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>11.</td><td>Press $\boxed{*}\boxed{4}\boxed{*}\boxed{*}\boxed{1}\boxed{0}\boxed{1}\boxed{*}\boxed{1}\boxed{*}$.
(The drum surface potential will be adjusted.)
Press $\boxed{*}\boxed{1}\boxed{*}$. Select the following addresses in turn and read the display. ("L" appears on the first display and is not keyed in.)
<table>
<tr><th>Address</th><th>Display</th></tr>
<tr><td>L210</td><td>V_{D1}</td></tr>
<tr><td>L211</td><td>V_{D1}</td></tr>
<tr><td>L212</td><td>V_{D2}</td></tr>
<tr><td>L213</td><td>V_{L2}</td></tr>
<tr><td>L274</td><td>V_{D3}</td></tr>
<tr><td>L275</td><td>V_{L3}</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>Primary corona and grid bias output system</td><td>12.</td><td>Is the value for V_{D1} approx. 300, V_{D2} approx. 500 or 600 and for V_{D3} approx. 800?</td><td>NO</td><td>Do the zero-level check. If the result is normal, check the primary corona and grid bias output system.</td></tr>
<tr><td>Laser output system</td><td>13.</td><td>Is V_{L1} approx. 100?
Is V_{L2} approx. 150?</td><td>NO</td><td>Do the zero-level check. If the result is normal, check the primary corona and grid bias output system.</td></tr>
<tr><td>Environment sensor</td><td rowspan="2">14.</td><td rowspan="2">Press the buttons under the 7-segment displays so that each displays "3".
Press $\boxed{*}\boxed{3}\boxed{*}\boxed{*}\boxed{1}\boxed{0}\boxed{1}\boxed{*}\boxed{*}\boxed{+/-}\boxed{+/-}\boxed{*}$.
(This permits manual setting of the target contrast potential.)
Set the power switch OFF, then ON. Make several copies. Are copy images improved?</td><td>YES</td><td>Check the environment sensor.</td></tr>
<tr><td>Photosensitive drum</td><td>NO</td><td>Replace the photosensitive drum.</td></tr>
</table>

2. Uneven density

Location/type of fault	Step	Check	Result	Measure
Height of primary corona wire	1.	Follow the basic image adjustment procedure on p. 7-1. Are images improved?	YES	End
Image Scanner	2.	If there is uneven density on a copy, is it a uniform stripe approx. 60 mm wide? 	YES	Refer to Chapter 7 in the Image Scanner Service Manual.
Preconditioning exposure lamps	3.	Are the preconditioning exposure lamp ON while copies are being made?	NO	1. Replace any failed lamps. 2. Replace the DC controller PCB.
Developing unit	4.	Is the developing cylinder evenly covered with toner?	NO	1. Clean the tip of the blade in the developing unit. (Use a dry cloth.) 2. Clean the surface of the developing cylinder. (Use a cloth moistened with water, then a dry cloth.)
Corona units copy paper			YES	1. Clean all corona units (wires and frames) and check the position of each corona wire. 2. Change the copy paper.

3. Fogging

Location/type of fault	Step	Check	Result	Measure
	1.	Follow the basic image adjustment procedure on p. 7-1. Are copy images improved?	YES	End
Dustproofing glass	2.	Clean the dustproofing glass. Are images improved?	YES	End
Drum cleaning unit	3.	Is the drum cleaning unit installed correctly?	NO	Install it correctly.
Preconditioning exposure lamps	4.	Are the preconditioning exposure lamps ON while copies are being made?	NO	1. Replace any failed lamps. 2. Replace the DC controller PCB.
Developing system			YES	Check the developing system.

4. Vertical strips and lines

Location/type of fault	Step	Check	Result	Measure
	1.	Select the halftone test print, then make copies. Are there vertical strips/lines on the copy image?	NO	Refer to Chapter 7 in the Scanner Service Manual.
	2.	Set the power switch OFF during a copying operation, while the copy is at the feeder. Are there vertical lines on the copy image?	NO	Go to step 6.
Drum cleaning unit	3.	Is any foreign matter, such as paper, caught at the cleaning blade of the drum cleaning unit?	YES	Remove the foreign matter. Clean the cleaning blade and the externals of the drum cleaning unit.
	4.	Is the edge of the cleaning blade nicked? (Feel the edge.)	YES	Replace the cleaning blade.
Photosensitive drum	5.	Is the photosensitive drum scratched around the drum?	YES	Replace the photosensitive drum. Determine the cause of scratches.
Primary corona wire			NO	Clean the primary corona wire and the grid wire.
Fixing unit	6.	Is the upper fixing roller scratched around the roller?	YES	1. Replace the upper fixing roller. 2. Check if the cleaning belt is being taken up correctly.
			NO	Check if the inlet of the fixing assembly is dirty.

5. White strips and lines (vertical)

Location/type of fault	Step	Check	Result	Measure
Fixing unit	1.	Start a copying operation with the copyboard cover raised. Set the power switch OFF while copy is at the feeder. Are there white lines or strips on the image?	NO	1. Clean the fixing unit inlet guide area (upper and lower). 2. Check the upper roller in the fixing unit. 3. Check whether the cleaning belt is being taken up correctly and is cleaning the fixing roller properly. 4. Clean the separation claw.
Developing units	2.	Select the horizontal-stripe test print in the service mode, then make copies. Do white stripes or lines appear only in a particular color on the copy?	YES	Check the edge of the cleaning blade of the developing unit that causes white stripes or lines.
Copy paper	3.	Use copy paper from a new package. Are copy images improved?	YES	The copy paper has absorbed water. Advise the user how to store paper.
Photosensitive drum	4.	Is the photosensitive drum scratched around the drum?	YES	Replace the photosensitive drum. Determine the cause of scratches.
Copy paper contact			NO	Check if copy paper contacts anything when it is on the transfer drum.

6. Dirty reverse side of copy

Location/type of fault	Step	Check	Result	Measure
	1.	Set the power switch OFF during a copying operation, while the copy is at the feeder assembly. Is the reverse side of the paper dirty?	NO	Go to step 4.
Cassette holder	2.	Select the horizontal-stripe test print in the service mode, then make copies. Is the right-left position of the image correct on the copy?	NO	Adjust the position of the cassette holder.
Developing units, drum cleaning unit, transfer drum unit	3.	Is the transfer drum sheet dirty?	YES	1. Check whether toner is leaking from developing units. 2. Check whether toner is leaking from the waste toner receptacle in the transfer drum unit. 3. Check whether toner is leaking from the drum cleaning unit.
Fixing unit	4.	Is the cleaning belt of the fixing assembly being taken up correctly? Is the upper roller being cleaned properly?	NO	1. Check the cleaning belt take-up mechanism. 2. Clean the upper and lower fixing rollers. 3. Clean the inlet guide of the fixing unit.
Delivery unit			YES	Clean the delivery rollers and the separation claw.

7. Poor fixing

Location/type of fault	Step	Check	Result	Measure
Upper fixing roller, Lower fixing roller	1.	Does poor fixing occur in the direction of copy paper feed?	YES	1. Check whether there are deep scratches around the upper or lower fixing roller. 2. Check whether the separation claw is positioned correctly.
Fixing roller heaters	2.	Do heaters (H1 and H2) go ON when the power is switched ON?	NO	Refer to "Fixing roller heaters do not operate".
Roller pressure	3.	Is the nip width within tolerance?	NO	Adjust the roller pressure (nip width).
Thermistor			YES	Check whether the thermistor is defective.

8. Blank areas

Location/type of fault	Step	Check	Result	Measure
	1.	Follow the basic image adjustment procedure on p. 7-1. Are copy images improved?	YES	End
Developing units	2.	Do blank areas appear only in areas of a particular color?	YES	Check the developing unit of the color in which blank areas appear.
Photosensitive drum	3.	Do blank areas appear at intervals of approx. 25 cm?	YES	1. Clean the photosensitive drum. 2. If there are deep axial scratches (along the drum) replace it.
Copy paper	4.	Are images improved when copy paper from a new package is used?	YES	The copy paper has absorbed water. Advise the user how to store paper.
DS rail			NO	Check whether there is foreign matter on the scanner (DS) rails.

9. Blank copy

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td rowspan="2">Transfer corona unit</td><td>1.</td><td>Is the transfer corona unit pushed in securely?</td><td>NO</td><td>Push the corona unit in fully.</td></tr>
<tr><td>2.</td><td>Is the corona wire broken?</td><td>YES</td><td>Replace the corona wire.</td></tr>
<tr><td>Developing cylinder drive motor</td><td>3.</td><td>Does the developing cylinder drive motor rotate while copies are being made?</td><td>NO</td><td>Check the motor.</td></tr>
<tr><td>Transfer drum spacing cam clutch</td><td>4.</td><td>Are the transfer drum and the photosensitive drum in contact while copies are being made?</td><td>NO</td><td>Check the transfer drum spacing cam clutch unit.</td></tr>
<tr><td>Laser output system</td><td>5.</td><td>Press $\boxed{*}\boxed{4}\boxed{*}\boxed{*}\boxed{1}\boxed{0}\boxed{1}\boxed{*}\boxed{1}\boxed{*}$.
(The drum surface potential will be adjusted automatically.)
Press $\boxed{*}\boxed{1}\boxed{*}$, then select the following addresses in turn and read the displays. (Do not key in “L”.)<table><tr><th>Address</th><th>Data</th></tr><tr><td>L211</td><td>V_{L1}</td></tr><tr><td>L213</td><td>V_{L2}</td></tr></table>Is the value for V_{L1} approx. 100 and for V_{L2} approx. 150?</td><td>NO</td><td>Do the zero-level check. If the result is normal, check the laser output system.</td></tr>
<tr><td>High-voltage cable</td><td rowspan="2">6.</td><td rowspan="2">Is there continuity between the connectors of the high-voltage cable connected to the transfer corona unit?</td><td>NO</td><td>Replace the high-voltage cable.</td></tr>
<tr><td>High-voltage system</td><td>YES</td><td>Check the high-voltage system for the transfer corona unit.</td></tr>
</table>

10. Black copy

Location/type of fault	Step	Check	Result	Measure
Primary corona unit	1.	Is the primary corona unit pushed in securely?	NO	Push it in fully.
	2.	Is the corona wire broken?	YES	Replace the corona wire.
	3.	Select the horizontal-stripe test print in the service mode, then make copies. Are images normal?	YES	Refer to Chapter 7 in the scanner manual.
High-voltage cable	4.	Is there continuity between the connectors of the high-voltage cable connected to the primary corona unit?	NO	Replace the high-voltage cable.
Primary corona and grid bias output system			YES	Check the primary corona and grid bias output system.

IV. OPERATION TROUBLESHOOTING

A. Troubleshooting by Faulty Operation

1. E000 is indicated

Location/type of fault	Step	Check	Result	Measure
	1	1. Check that the fixing unit is installed in the copier securely. Do the fixing roller heaters operate when the power is switched is ON?	NO	Refer to "Fixing roller heaters do not operate".
DC controller PCB	2	Set the power switch OFF. Set multimeter to the 12 V range and connect the leads to J101-6B(+) and J111-2(−) on the DC controller PCB. When the rollers of the fixing assembly are at room temperature, set the power switch ON. Does the voltage gradually decrease from approx. 4 V to approx. 2.0 V?	YES	Replace the DC controller PCB.
Thermistor			NO	Replace the thermistor (TH1).

2. E005 is indicated

Location/type of fault	Step	Check	Result	Measure
	1	Does E005 go OFF when the cleaning belt is replaced?	YES	End
Remaining cleaning belt sensor (Q25)	2	Is the remaining cleaning belt sensor (Q25) functioning normally?	NO	Replace the sensor (Q25)
DC controller PCB			YES	Replace the DC controller PCB.

3. E010 is indicated

Location/type of fault	Step	Check	Result	Measure
Photosensitive drum	1	Set the power switch ON. Does LED3 on the motor driver PCB go ON during INITIAL ROTATION?	YES	Check whether the photosensitive drum is dragging.
DC controller PCB	2	Set the power switch OFF, then ON. Does LED1 on the motor driver PCB go ON during INITIAL ROTATION?	YES	Check the wiring between the motor driver PCB and the DC controller PCB. If the wiring is normal, replace the DC controller PCB.
Drum motor	3	Set the multimeter to the 30 VDC range. Set the power switch OFF. Connect the leads to J404-2(+) and J404-1(−) on the motor driver PCB. Is the voltage approx. 12 V when the drum begins to turn?	YES	Replace the drum motor.
Motor driver PCB	4	Set the multimeter to the 12 VDC range. Set the power switch OFF. Connect the leads to J402-1(+) and J402-6(−) on the motor driver PCB. Set the power switch ON. Does the voltage decrease from approx. 5 V to 0 V when the drum motor begins to turn?	YES	Replace the motor driver PCB.
DC controller PCB			NO	Check the wiring between the motor driver PCB and the DC controller PCB. If the wiring is normal, replace the DC controller PCB.

4. E012 is indicated

Location/type of fault	Step	Check	Result	Measure
Overload drive unit	1	The power switch ON. Does LED3 on the motor driver PCB go ON during INITIAL ROTATION?	YES	Check whether any drive unit driven by the main motor is overloaded.
DC controller PCB	2	Set the power switch OFF, then ON. Does LED2 on the motor driver PCB go ON during drum INITIAL ROTATION?	YES	Check wiring between the motor driver PCB and the DC controller PCB. If the wiring is normal, replace the DC controller PCB.
Main motor	3	Set the multimeter to the 30 VDC range. The power switch OFF. Connect the leads to J403-1(−) and J403-2(+) on the motor driver PCB. Set the power switch ON. Is the voltage approx. 15 V when the during INITIAL ROTATION?	YES	Replace the main motor
Motor driver PCB	4	Set the multimeter to the 12 VDC range. The power switch OFF. Connect the leads of J402-2(+) and J402-6(−) on the motor driver PCB decrease from set the power switch ON. Is the voltage approx. 5 V to 0 V when the main motor is rotating?	YES	Replace the motor driver PCB.
DC controller PCB			NO	Check wiring between the motor driver PCB and the DC controller PCB. When the wiring is normal, replace the DC controller PCB.

5. E020 is indicated

a. Items monitored in case of 001 display

Location/type of fault	Step	Check	Result	Measure
	1	Are all the data value for L260 to L263 less than 0.2?	YES	Go to step 4.
Optical fiber unit	2	Is the optical fiber unit fitted properly to the developing assembly having the data value of less than 0.2?	NO	Remove developer and clean the developing assembly. Thoroughly clean the area optical fiber unit is to be fitted and then fit the unit.
Optical fiber unit	3	Is the optical fiber unit for the above developing assembly bent or damaged?	YES	Replace the optical fiber unit.
Display PCB			NO	Check the wiring between display PCB and DC controller PCB for open circuit. If none, replace the display PCB.
Toner concentration sensor lamp	4	Is the toner concentration sensor lamp lit?	NO	Replace the lamp.
Display PCB DC controller PCB	5	Set the multimeter to DC 12V. Does the voltage between J402-3(+) and J402-5(−) of the display PCB go to 3V during copying?	YES	1. Replace the display PCB. 2. Replace the DC controller PCB.
Toner density detection PCB			NO	Replace toner concentration sensor PCB.

b. Items monitored in case of 002 display

Location/type of fault	Step	Check	Result	Measure
	1	Are all the data value for L260 to L263 more than 3.5?	NO	1. Replace the display PCB. 2. Adjust density of developer.
Filter	2	Is the filter for detecting toner density damaged?	YES	Replace the filter.
Cable (harness)	3	Is the lamp for toner density detection continuously lit brightly?	YES	Check for short circuit of the cable via the frame (GND).
Toner density detection PCB	4	Set the multimeter to 30VDC. Does the voltage between J501-2(+) and J501-4(−) on the toner concentration sensor PCB go from 0V to 3V during copying when the solenoid to change the filter is turned ON.	NO	Replace the toner concentration sensor PCB.
Display PCB DC controller PCB			YES	1. Replace the display PCB. 2. Replace the DC controller PCB.

c. Items monitored in case of 003 display

Location/type of fault	Step	Check	Result	Measure
	1	Do L260 to L264, L261 to L265, L262 to L266 and L263 to L267 all display the same value?	NO	Check whether the solenoid which turns ON to change the filter is touching the filter frame or cable.
Solenoid (SL21) for switching the filter	2	Is the solenoid to change the filter turned ON during copying?	NO	Replace the solenoid to switch the filter.
Toner density detection filter			YES	Check whether the filter for toner density detection is damaged.

d. Items monitored in case of 004 display

Location/type of fault	Step	Check	Result	Measure
	1	When L260 to L244, L261 to L245, L262 to L246 and L263 to L247 are compared, are the values of L260, L261, L262, and L263 all more than half?	YES	Check whether there is degradation or soiling of toner concentration sensor lamp.
Optical fiber unit	2	Is the optical fiber unit fitted properly to the developing assembly having the data value of less than 0.2?	NO	Remove developer and clean the developing assembly. Thoroughly clean the area optical fiber unit is to be fitted and then fit the unit.
Optical fiber unit	3	Is the optical fiber unit for the above developing assembly bent or damaged?	YES	Replace the optical fiber unit.
Display PCB			NO	Check the wiring between display PCB and DC controller PCB for open circuit. If none, replace the display PCB.

e. Items monitored in case of 005/006 display

Location/type of fault	Step	Check	Result	Measure
	1	Confirm the developer colors for the L240>L254, L241>L234, L242>L256, and L243>L257 values given.		
Optical fiber unit	2	Is there toner in the developing assembly?	YES	Check whether there is clinging of carrier to the optical fiber unit and keep the unit free from such matter.
Hopper unit			NO	Check clogging of toner in the hopper and damage to the feed screw.

f. Items monitored in case of 008 display

Location/type of fault	Step	Check	Result	Measure
		Input $\boxed{*}\boxed{4}\boxed{*}$ in the service mode a couple of times and read the displayed value. Is variation in the displayed values more than 0.3? P131 – L240/L244 P132 – L241/L245 P133 – L242/L246 P134 – L243/L247	NO	Finished
Developing assembly Optical unit			YES	1. Confirm whether the developing assembly is properly fitted. 2. Confirm whether the optical fiber unit is properly fitted.

6. E021 is indicated

Location/type of fault	Step	Check	Result	Measure
	1	Set the power switch OFF. Turn the turret a distance away from its the HOME position. Set the power switch ON. Does the turret rotate?	NO	Go to step 4.
Turret HOME position sensor (Q13) DC controller PCB	2	In step 1, did the turret turn twice, then stop at the HOME position?	NO	- Check the rotor HOME position sensor (Q13). - If Q13 is normal, replace the DC controller PCB.
Turret	3	Press $\boxed{*}$ $\boxed{1}$ $\boxed{*}$ $\boxed{*}$ $\boxed{1}$ $\boxed{3}$ $\boxed{6}$ $\boxed{*}$ Do all displays show "0"?	YES	- The turret is dragging. Inspect it to determine why. - Check the turret motor connectors for poor contact.
Turret lock release solenoid (SL16)	4	Did the turret lock release solenoid operate when the power was switched ON?	NO	Check the solenoid wiring. If satisfactory, replace the turret lock release solenoid.
Main motor	5	Is LED2 on the motor driver PCB ON during copying operation?	NO	Main motor is dragging. Check the motor.
Noise filter NF2	6	Is line voltage present between CNA-1 and CNA-2 on the turret driver PCB?	NO	Check noise filter NF-2.
Turret motor controller PCB, Turret motor driver PCB, Turret motor drive unit, Turret motor			YES	Try replacing the turret motor controller PCB, turret rotor driver PCB, turret drive unit and turret motor, in that order.

7. E030 is indicated

Location/type of fault	Step	Check	Result	Measure
	1	Does the total counter operate correctly?	NO	Refer to "Counter does not operate".
DC controller PCB			YES	Replace the DC controller PCB.

8. E040 is indicated

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>Q8, Q9 Cassette installation position</td><td>1</td><td>Remove the cassette, then reinstall it. Does the lifter rise when the COPY START key is pressed?</td><td>YES</td><td>1. Check the cassette lifter position sensors (Q8 and Q9).
2. Check the cassette installaton position.</td></tr>
<tr><td>DC controller PCB.</td><td>2</td><td>Set the multimeter to the 30 VDC range. Connect the leads to the following connectors on the DC controller PCB. Does the voltage between each pair of connectors increase from 0 V to approx. 5 V when the COPY START key is pressed?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper lifter clutch</td><td>J103-3A</td><td>J103-25B</td></tr>
<tr><td>Lower lifter clutch</td><td>J103-3B</td><td>J103-25B</td></tr>
</table></td><td>NO</td><td>Replace the DC controller PCB</td></tr>
<tr><td>DC driver PCB</td><td rowspan="2">3</td><td rowspan="2">Set the multimeter to the 30 VDC range. Connect the leads to the following connectors on the DC driver PCB. Does the voltage between each pair of connectors decrease from 24 V to 0 V when the COPY START key is pressed?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper lifter clutch</td><td>J203-3A</td><td>J201-4</td></tr>
<tr><td>Lower lifter clutch</td><td>J203-4A</td><td>J201-4</td></tr>
</table></td><td>NO</td><td>Replace the DC driver PCB</td></tr>
<tr><td>Lifter clutch</td><td>YES</td><td>Check wiring between the DC driver PCB and CL1 (or CL2). When the wiring is normal, replace CL1 (or CL2).</td></tr>
</table>

9. E061 is indicated

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1</td><td>Press [*] [4] [*] [*] [1] [0] [1] [*] [1] [*].
(The drum surface potential will be adjusted.)
Read the display for the following addresses in turn.
Press [*] [1] [*]. Select each of the following addresses in turn by pressing [*] [Digit] [Digit] [Digit] [*] (Ignore "L".) Record the data for each.
<table>
<tr><th>Address No.</th><th>Data</th></tr>
<tr><td>L210</td><td>V_D1</td></tr>
<tr><td>L211</td><td>V_L1</td></tr>
<tr><td>L212</td><td>V_D2</td></tr>
<tr><td>L213</td><td>V_L2</td></tr>
<tr><td>L230</td><td>Grid bias for M developing</td></tr>
<tr><td>L231</td><td>Grid bias for C developing</td></tr>
<tr><td>L232</td><td>Grid bias for Y developing</td></tr>
<tr><td>L233</td><td>Grid bias for BK developing</td></tr>
<tr><td>L234</td><td>Developing bias for M developing</td></tr>
<tr><td>L235</td><td>Developing bias for C developing</td></tr>
<tr><td>L236</td><td>Developing bias for Y developing</td></tr>
<tr><td>L237</td><td>Developing bias for BK developing</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>Primary corona and grid bias output system</td><td>2</td><td>Is the value displayed for V_{D1} approx. 300, and for V_{D2} approx. 500 or 600?</td><td>NO</td><td>Do the zero-level check. If the result is normal, check the primary corona and grid bias output system.</td></tr>
<tr><td>Laser output system</td><td>3</td><td>Is the value displayed for V_{L1} approx. 100, and for V_{L2} approx. 150?</td><td>NO</td><td>Check the laser output system.</td></tr>
<tr><td>Grid bias output system</td><td>4</td><td>Are the values displayed for L230 through L233 in the range 250 to 900?</td><td>NO</td><td>1. If 900 or more is displayed, replace the photosensitive drum.
2. If 250 or less is displayed, move the primary corona wire closer to the photosensitive drum.</td></tr>
<tr><td>Photosensitive drum</td><td>5</td><td>Are the values displayed for L234 through L237 in the range 700 or less?</td><td>NO</td><td>Replace the photosensitive drum.</td></tr>
</table>

Location/type of fault	Step	Check	Result	Measure
Environment sensor	6	Press the buttons below the 7-segment displays to set the displays to 3. Press [*] [3] [*] [*] [1] [0] [1] [*] [*] [+/−] [+/−] [*]. (This permits manual adjustment of the target contrast potential) Set the power switch OFF, then ON. Make copies. Are copy images improved?	YES	Check the environment sensor.
Photosensitive drum			NO	Replace the photosensitive drum.

10. E070 is indicated

Location/type of fault	Step	Check	Result	Measure
	1	Does the transfer drum rotate when the power is switched ON?	NO	Refer to "E010 is lit".
Connector	2	Is the connector of the transfer drum connected?	NO	Plug in the connector.
Continuity	3	Is there continuity between the front flange of the transfer drum and the frame of the drum?	NO	Check the transfer drum.
Q16	4	Is the transfer drum home position sensor (Q16) functioning normally?	NO	Replace Q16.
DC controller PCB			YES	Replace the DC controller PCB.

11. E071 is indicated

Location/type of fault	Step	Check	Result	Measure
Connector	1.	Is the connector of the transfer drum connected?	NO	Plug in the connector
Continuity	2.	Is there continuity between the front flange of the transfer drum and the frame of the drum?	NO	Check the transfer drum.
Q15	3.	Is the image leading edge sensor (Q15) functioning normally?	NO	Replace Q15.
DC controller PCB			YES	Replace the DC controller PCB.

12. E100 is indicated

Location/type of fault	Step	Check	Result	Measure
Position of reflector	1.	Does E100 go OFF after the BD adjustment has been performed?	YES	End
Shutter	2.	Does the shutter in the light guide open when the door switch is actuated with a screwdriver blade?	NO	Check the shutter operation.
Laser unit, DC controller PCB	3.	Insert the laser power tester into the port. Press [*][4][*] [*][1][1][1][*] [1][*]. (The laser is switched ON.) Is there any output from the laser?	NO	Replace the laser unit or the DC controller PCB.
Laser power			YES	Adjust the laser power.

13. E110 is indicated

Location/type of fault	Step	Check	Result	Measure
Lock plate of the scanning mirror drive motor	1.	Has the lock plate of the scanning mirror drive motor been released?	NO	Move the lock plate and release the motor.
DC controller PCB	2.	Does LED201 on the scanning mirror motor driver PCB go ON whithin 60 seconds after the power is switched ON?	YES	Check the connectors and wiring between the scanning mirror motor driver PCB to the DC controller PCB.
Scanning mirror driver PCB, Scanning mirror motor	3.	Set the multimeter to the 30 VDC range. Does the voltage between J101-11B(+) and J112-5(−) on the DC controller PCB decrease to 0 V after the power is switched ON?	YES	Check wiring between the DC controller PCB and the scanning mirror motor driver PCB. If it is normal, replace the scanning mirror motor driver PCB or the scanning mirror motor.
DC controller PCB			NO	Replace the DC controller PCB.

14. E120 is indicated

Location/type of fault	Step	Check	Result	Measure
DC controller PCB	1.	Does the LED202 on the DC driver PCB go ON within 60 seconds after the power is switched ON?	YES	Check wiring between the DC driver PCB and the DC controller PCB. If it is normal, replace the DC controller PCB.
Laser unit	2.	Set the multimeter to the 3 VDC range. Is the voltage between J205-2(+) and J205-1(−) on the DC driver PCB between 1.5 V and 1.8 V within 60 seconds after the power is switched ON?	NO	Replace the laser unit.
DC driver PCB			YES	Replace the DC driver PCB.

15. AC power is not supplied

Location/type of fault	Step	Check	Result	Measure
Power plug	1.	Is the power cord plugged into an outlet?	NO	Plug it in.
AC power	2.	Is AC line voltage present at the outlet?	NO	The cause of the trouble does not lie in the copier. Explain this to the user.
	3.	Is AC line voltage present between J1-1 and J1-2? (J1 is near the power cord mount.)	YES	Go to step 5.
Circuit breaker (CB1)	4.	Check continuity between the terminals of the circuit breaker (CB1). Is the resistance 0 Ω ?	NO	Reset the circuit breaker and check the continuity again. If the resistance is still not 0 Ω, replace the circuit breaker (CB1).
Power cord Line filter (LF1)			YES	Check the power cord and the line filter (LF1). Replace any part necessary.
Door switch	5.	Remove the door switch. Set the multimeter to the ohms × 1 range. Connect the multimeter leads to switch terminals 1 and 2. Does the multimeter read 0 Ω when the actuator is pressed, and ∞ Ω when the actuator is released?	NO	Replace MS1.
Power switch (SW1)	6.	Set the multimeter to the ohms × 1 range. Connect the multimeter leads to the terminals of the power switch (SW1). Does the multimeter read 0 Ω when the switch is set ON, and ∞ Ω when the switch is set OFF?	NO	Replace SW1.
Wiring			YES	Check the AC power wiring of the machine. Check connectors for poor contact.

16. DC power is not supplied

Location/type of fault	Step	Check	Result	Measure
AC power	1.	Is AC line voltage present between J801(J01)-1 and J801(J01)-2 on the DC power supply PCB?	NO	Refer to "AC power is not supplied".
	2.	Set the power switch OFF and unplug the power cord. After about one minute, plug in the cord again. Does the LED on the display PCB go ON when the power switch is set ON?	YES	End
DC power supply PCB (PU1)	3.	Set the multimeter to the 12 VDC range. Is there +5 V between J805-9(+) and J805-8(−) on the DC power supply PCB (PU1)?	NO	Check the continuity between J803-3 and J805-9 on the DC power supply PCB. If the result is normal, replace the DC power supply PCB.
	4.	Set the multimeter to the 30 VDC range. Is there +24 V between J101-16B(+) and J107-8(−) on the DC controller PCB?	NO	Check the front door switch and the delivery door switch. If they are functioning normally, replace the DC power supply PCB.
			YES	Check relays RL1 and RL2. If they function normally, replace the DC controller PCB.

17. Paper is not picked up from the cassette.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1.</td><td>Does the COPY OUT indicator remain after the COPY START key is pressed?</td><td>YES</td><td>Refer to "The PAPER OUT indicator does not go OFF".</td></tr>
<tr><td>Copy paper</td><td>2.</td><td>Is there copy paper of the specified size in the cassette?</td><td>NO</td><td>Replace the copy paper.</td></tr>
<tr><td>Drive system</td><td>3.</td><td>Is the main motor driving the pick-up mechanism satisfactorily?</td><td>NO</td><td>Check the belts and gears</td></tr>
<tr><td></td><td>4.</td><td>Is the leading edge of copy paper fed to the feed roller?</td><td>YES</td><td>Refer to "Registration roller or feed roller does not rotate".</td></tr>
<tr><td>DC controller PCB</td><td>5.</td><td>Set the multimeter to the 30 VDC range.
Connect the probes to the following connectors on the DC controller PCB. Does the voltage momentarily rise from 0 V to approx. 4 V when the COPY START key is pressed?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper cassette paper pick-up roller clutch</td><td>J103-1A</td><td>J110-2</td></tr>
<tr><td>Lower cassette paper pick-up roller clutch</td><td>J103-1B</td><td>J110-2</td></tr>
</table></td><td>NO</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>DC driver PCB</td><td rowspan="2">6.</td><td rowspan="2">Set the multimeter to the 30 VDC range.
Connect the probes to the following connectors on the DC driver PCB. Does the voltage decrease from 24 V to 0 V when the COPY START key is pressed?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper cassette paper pick-up roller clutch</td><td>J203-1A</td><td>TP201</td></tr>
<tr><td>Lower cassette paper pick-up roller clutch</td><td>J203-2A</td><td>TP201</td></tr>
</table></td><td>NO</td><td>Replace the DC driver PCB</td></tr>
<tr><td>Cassette paper pick-up roller clutch</td><td>YES</td><td>Check wiring from the DC driver PCB to CL3 or CL4. If the wiring is normal, replace CL3 or CL4.</td></tr>
</table>

18. Paper is not picked up manually.

Location/type of fault	Step	Check	Result	Measure
	1.	Is paper picked up correctly from the upper cassette?	NO	Refer to "Paper is not picked up from the cassette".
Manual feed unit	2.	Does the MANUAL FEED indicator light when the manual feed level is lowered?	YES	Check that the manual feed assembly operates correctly, the surface of the guide plate is not deformed, and there is no foreign matter on the guide plate.
Photointerrupter (Q5), DC controller PCB			NO	1. Check Q5. 2. Replace the DC controller PCB.

19. Registration roller or feed roller does not rotate.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>Spring clutch</td><td>1.</td><td>Set the multimeter to the 30 VDC range. Successively connect the positive probe to the following connectors on the DC driver PCB and press the COPY START key. Does the voltage decrease from 24 V to 0 V after copy paper has been picked up?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Feed roller clutch solenoid</td><td>J203-8A</td><td>TP201</td></tr>
<tr><td>Registration roller clutch solenoid</td><td>J203-9A</td><td>TP201</td></tr>
<tr><td>Fast-feed solenoid</td><td>J203-7A</td><td>TP201</td></tr>
</table></td><td>YES</td><td>1. Check the spring clutch.
2. Chech whether the feed rollers or the registration rollers are overloaded.
3. Replace the feed or registration roller clutch solenoid.</td></tr>
<tr><td>DC controller PCB</td><td rowspan="2">2.</td><td rowspan="2">Set the multimeter to the 30 VDC range. Successively connect the positive probe to the following connectors on the DC controller PCB and press the COPY START key. Does the voltage increase from 0 V to 4 V after copy paper has been picked up?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Feed roller clutch solenoid</td><td>J103-2A</td><td>J110-2</td></tr>
<tr><td>Registration roller clutch solenoid</td><td>J103-2B</td><td>J110-2</td></tr>
<tr><td>Fast-feed solenoid</td><td>J103-6A</td><td>J110-2</td></tr>
</table></td><td>NO</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>DC driver PCB</td><td>YES</td><td>Replace the DC driver PCB.</td></tr>
</table>

20. Preconditioning exposure lamp does not go ON.

Location/type of fault	Step	Check	Result	Measure
Preconditioning exposure lamp PCB.	1.	Set the multimeter to the 30 VDC range. Does the voltage between J208-5(+) and TP201(−) on the DC driver PCB decrease from 24 V to 0 V when the COPY START key is pressed?	YES	Check wiring between the DC driver PCB and the preconditioning exposure lamp. If the wiring is normal, replace the preconditioning exposure lamp PCB.
DC controller PCB	2.	Set the multimeter to the 30 VDC range. Does the voltage between J103-21A(+) and J110-2(−) on the DC controller PCB increase from 0 V to 4 V when the COPY START key is pressed?	NO	Replace the DC controller PCB.
DC driver PCB			YES	Replace the DC driver PCB.

21. Fixing roller heaters does not operate.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1.</td><td>Set the power switch OFF and remove the fixing unit. Set the multimeter to the Ω × 1″ range. Is there continuity between J2-5 and J2-4 and between J2-5 and J2-3 of the fixing unit?</td><td>NO</td><td>Go to step 5.</td></tr>
<tr><td>Thermistor (TH1)</td><td>2.</td><td>Install the fixing unit
Set the multimeter to the 12 VDC range.
Is there 2 V or more between J101-7A(+) and J107-8 on the DC controller when the power switch is ON?</td><td>NO</td><td>Replace the thermistor.</td></tr>
<tr><td>DC controller PCB</td><td>3.</td><td>Set the power switch OFF.
Set the multimeter to the 12 VDC range.
Connect the probes to the following connectors on the DC controller. Is the voltage 0 V when the power switch is set ON? (Measure the voltage during STANDBY.)
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper fixing roller heater (H1)</td><td>J101-15A</td><td>J107-8</td></tr>
<tr><td>Lower fixing roller heater (H2)</td><td>J101-16A</td><td>J107-8</td></tr>
</table>
</td><td>NO</td><td>Replace the DC controller PCB.</td></tr>
</table>

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>AC driver PCB</td><td rowspan="2">4.</td><td rowspan="2">Set the multimeter to the 250 VAC range.
Connect the positive probe to the following connectors on the AC driver PCB. Is the voltage 0 V when the heater is ON? Is line voltage measured when the heater is OFF?
<table>
<tr><th></th><th>+</th><th>−</th></tr>
<tr><td>Upper fixing roller heater</td><td>J302-1</td><td>J302-2</td></tr>
<tr><td>Lower fixing roller heater</td><td>J302-6</td><td>J302-8</td></tr>
</table></td><td>NO</td><td>Replace the AC driver PCB.</td></tr>
<tr><td>Triac (Q1, Q2)</td><td>YES</td><td>Replace the triac.</td></tr>
<tr><td>Thermal fuse (FU1)
Thermoswitch</td><td>5.</td><td>Set the multimeter to the Ω × 1″ range. Is there continuity between the terminals of the thermal fuse or thermoswitch?</td><td>NO</td><td>Replace the thermal fuse or thermoswitch.</td></tr>
<tr><td>Upper fixing roller heater (H1)</td><td>6.</td><td>Connect the probes to the terminals of the upper fixing roller heater. Does the needle deflect?</td><td>NO</td><td>Check upper fixing roller heater. If it is installed correctly, replace the upper fixing roller heater.</td></tr>
<tr><td>Lower fixing roller heater</td><td rowspan="2">7.</td><td rowspan="2">Connect the probes to the terminals of the lower fixing roller heater. Does the needle deflect?</td><td>NO</td><td>Check lower fixing roller heater. If it is installed correctly, replace the lower fixing roller heater.</td></tr>
<tr><td>AC cable</td><td>YES</td><td>Check the AC cable in the fixing unit.</td></tr>
</table>

22. Drum heater does not operate.

Location/type of fault	Step	Check	Result	Measure
	1.	Is heater actually functioning? (Open the front door and remove the front middle cover. Is the drum shaft warm?)	YES	Drum heater is ON. No problem.
Thermistor	2.	Set the multimeter to the 12 VDC range. Is the voltage between J305-1(+) and J305-3(−) on the AC driver PCB 2 V or more when the power is ON?	NO	Replace the thermistor.
Drum heater	3.	Remove the drum heater. Set the multimeter to the Ω × 1″ range. Connect the probes to the heater terminals. Is there continuity?	NO	Replace the drum heater.
AC driver PCB			YES	Replace the AC driver PCB.

23. Counter does not operate.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>Counter</td><td>1.</td><td>Set the power switch OFF. Disconnect connector J59. Set the multimeter to the "Ω × 1k" range. Does the multimeter read approx. 200 Ω when the resistance between the following points is measured?
<table>
<tr><th>Counter</th><th>+</th><th>−</th></tr>
<tr><td>CNT1</td><td>J59-1</td><td>J59-4</td></tr>
<tr><td>CNT2</td><td>J59-2</td><td>J59-4</td></tr>
<tr><td>CNT3</td><td>J59-3</td><td>J59-4</td></tr>
<tr><td>CNT4</td><td>J59-5</td><td>J59-4</td></tr>
</table>
</td><td>NO</td><td>Replace the counter.</td></tr>
<tr><td>DC controller PCB</td><td rowspan="2">2.</td><td rowspan="2">Connect connector J59.
Set the multimeter to the 12 VDC range.
Does the voltage between the following connectors on the DC driver PCB change from approx. 0 V to approx. 5 V, then to approx. 0 V when the COPY START key is pressed?
Be sure to set the machine for the type of copying that matches the counter to be checked.
<table>
<tr><th>Counter</th><th>+</th><th>−</th></tr>
<tr><td>CNT1</td><td>J208-2</td><td>J201-4</td></tr>
<tr><td>CNT2</td><td>J208-3</td><td>J201-4</td></tr>
<tr><td>CNT3</td><td>J208-4</td><td>J201-4</td></tr>
<tr><td>CNT4</td><td>J203-11B</td><td>J201-4</td></tr>
</table>
</td><td>NO</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>DC driver PCB</td><td>YES</td><td>Replace the DC driver PCB.</td></tr>
</table>

24. PAPER OUT indicator does not go ON.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1.</td><td>Is C40 displayed on the display PCB?</td><td>YES</td><td>Refer to the Image Scanner Service Manual.</td></tr>
<tr><td></td><td>2.</td><td>Select the upper cassette and remove the casssette. Does the display go ON?</td><td>YES</td><td>Go to step 5.</td></tr>
<tr><td>Upper cassette paper sensor (Q6)</td><td>3.</td><td>Press [*][1][*][*][1][6][0][*].
Raise the paper sensor arm in the upper cassette pick-up unit.
Do all the 7-segment displays indicate 1 or 0?</td><td>NO</td><td>Replace Q6.</td></tr>
<tr><td>DC controller</td><td rowspan="2">4.</td><td rowspan="2">Press [*][1][*]. Select the following addresses in turn and press the associated upper cassette size sensing switch. (Refer to the table.)
Do all the 7-segment display indicate 0?
<table>
<tr><th>Address No.</th><th>Switch</th></tr>
<tr><td>[*][1][5][0][*]</td><td>SW704U</td></tr>
<tr><td>[*][1][5][1][*]</td><td>SW703U</td></tr>
<tr><td>[*][1][5][2][*]</td><td>SW702U</td></tr>
<tr><td>[*][1][5][3][*]</td><td>SW701U</td></tr>
</table></td><td>YES</td><td>Replace the DC controller.</td></tr>
<tr><td>Cassette size sensing switches</td><td>NO</td><td>Replace any faulty cassette size sensing switches.</td></tr>
<tr><td>Lower cassette paper sensor (Q7)</td><td>5.</td><td>Press [*][1][*] [*][1][6][1][*].
Raise the paper sensor arm of the lower cassette paper pickup unit.
Do all the 7-segment displays indicate 1 or 0?</td><td>NO</td><td>Replace Q7.</td></tr>
<tr><td>DC controller PCB</td><td rowspan="2">6.</td><td rowspan="2">Press [*][1][*]. Select the following addresses in turn and press the associated lower cassette size sensing switch.
Do all the 7-segment displays indicate 0?
<table>
<tr><th>Address No.</th><th>Switch</th></tr>
<tr><td>[*][1][5][4][*]</td><td>SW704L</td></tr>
<tr><td>[*][1][5][5][*]</td><td>SW703L</td></tr>
<tr><td>[*][1][5][6][*]</td><td>SW702L</td></tr>
<tr><td>[*][1][5][7][*]</td><td>SW701L</td></tr>
</table></td><td>YES</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>Cassette size sensing switches</td><td>NO</td><td>Replace any faulty cassette size sensing switches.</td></tr>
</table>

25. PAPER OUT Indicator lights does not go OFF.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td></td><td>1.</td><td>Is C40 displayed on the display PCB?</td><td>NO</td><td>Refer to the Image Scanner service manual.</td></tr>
<tr><td>Cassette position</td><td>2.</td><td>Is the cassette pushed in fully?</td><td>NO</td><td>Push it in fully.</td></tr>
<tr><td></td><td>3.</td><td>Install a cassette and press the COPY START key. Does the main motor rotate?</td><td>YES</td><td>Go to step 5.</td></tr>
<tr><td>Cassette size sensing switches</td><td rowspan="2">4.</td><td rowspan="2">Press ⧆1⧆. Select the following addresses in turn and press the associated upper or lower cassette size sensing switch. Do all the 7-segment displays indicate 0?
<table>
<tr><th>Address No.</th><th>Switch</th></tr>
<tr><td>⧆150⧆</td><td>SW704U</td></tr>
<tr><td>⧆151⧆</td><td>SW703U</td></tr>
<tr><td>⧆152⧆</td><td>SW702U</td></tr>
<tr><td>⧆153⧆</td><td>SW701U</td></tr>
<tr><td>⧆154⧆</td><td>SW704L</td></tr>
<tr><td>⧆155⧆</td><td>SW703L</td></tr>
<tr><td>⧆156⧆</td><td>SW702L</td></tr>
<tr><td>⧆157⧆</td><td>SW701L</td></tr>
</table></td><td>NO</td><td>Replace any faulty cassette size sensing switch.</td></tr>
<tr><td>DC controller PCB</td><td>YES</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>Paper lifter clutch (CL1, CL2)</td><td>5.</td><td>Is paper in the cassette raised by the lifter while copies are being made?</td><td>NO</td><td>Replace the paper lifter clutch.</td></tr>
<tr><td>Paper sensor (Q6, Q7)</td><td rowspan="2">6.</td><td rowspan="2">Press ⧆1⧆. Select the following addresses in turn and raise the paper sensor arm of the upper and lower cassette paper sensors. Do all 7-segment displays indicate 1 or 0?
<table>
<tr><th>Address No.</th><th>Sensor</th></tr>
<tr><td>⧆160⧆</td><td>Upper cassette paper sensor (Q6)</td></tr>
<tr><td>⧆161⧆</td><td>Lower cassette paper sensor (Q7)</td></tr>
</table></td><td>NO</td><td>Replace Q6 or Q7.</td></tr>
<tr><td>DC controller PCB</td><td>YES</td><td>Replace the DC controller PCB.</td></tr>
</table>

26. JAM indicator does not go ON.

Location/type of fault	Step	Check	Result	Measure
Image scanner	1.	Do J30 through J36 on the display PCB go ON when paper jams?	YES	Refer to the Image Scanner Service Manual.
Sensors Q4, Q10, Q11, Q17, Q18	2.	Are the following sensors functioning normally: feed unit paper sensor (Q10), registration unit paper sensor (Q11), transfer unit paper sensor (Q18), separation unit paper sensor (Q17), and delivery unit paper sensor (Q4).	NO	- Replace faulty sensor(s). - Clean all other sensors.
DC controller PCB			YES	Replace the DC controller PCB.

27. JAM indicator goes ON when paper is being fed normally.

Location/type of fault	Step	Check	Result	Measure
Image scanner	1.	Do J30 through J36 on the display PCB go ON when the JAM indicator is ON?	NO	Refer to the Image Scanner Service Manual.
Sensors Q4, Q10, Q11, Q17, Q18	2.	Are the following sensors functioning normally: feed unit paper sensor (Q10), registration unit paper sensor (Q11), transfer unit paper sensor (Q18), separation unit paper sensor (Q17), and delivery unit paper sensor (Q4).	NO	- Replace faulty sensor(s). - Clean all other sensors.
DC controller PCB			YES	Replace the DC controller PCB.

28. TONER OUT indicator does not go ON when there is no toner.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>Faulty Image scanner</td><td>1.</td><td>Is C43 displayed on the display PCB?</td><td>YES</td><td>Refer to the Image Scanner Service Manual.</td></tr>
<tr><td>DC controller PCB</td><td rowspan="2">2.</td><td rowspan="2">Press [*] [1] [*]. Select the following addresses in turn. Do all 7-segment displays indicate 0?
<table>
<tr><th>Address</th><th>Sensor</th></tr>
<tr><td>[*][1][3][0][*]</td><td>M toner sensor</td></tr>
<tr><td>[*][1][3][1][*]</td><td>C toner sensor</td></tr>
<tr><td>[*][1][3][2][*]</td><td>Y toner sensor</td></tr>
<tr><td>[*][1][3][3][*]</td><td>BK toner sensor</td></tr>
</table></td><td>YES</td><td>Replace the DC controller PCB.</td></tr>
<tr><td>Toner sensors Q21, Q22, Q23, and Q24</td><td>NO</td><td>Replace the toner sensor in the empty hopper unit.</td></tr>
</table>

29. TONER OUT indicator does not go OFF.

<table>
<tr><th>Location/type of fault</th><th>Step</th><th>Check</th><th>Result</th><th>Measure</th></tr>
<tr><td>Image Scanner</td><td>1.</td><td>Is C43 displayed on the display PCB</td><td>NO</td><td>Refer to the Image Scanner Service Manual.</td></tr>
<tr><td>Toner</td><td>2.</td><td>Is there toner in the hopper?</td><td>NO</td><td>Add toner.</td></tr>
<tr><td>Toner sensors Q20, Q21, Q22, and Q23</td><td rowspan="2">3.</td><td rowspan="2">Press [*][1][*]. Select the following addresses in turn. Do all 7-segment displays indicate 1?
<table>
<tr><th>Adress</th><th>Sensor</th></tr>
<tr><td>[*][1][3][0][*]</td><td>M toner sensor</td></tr>
<tr><td>[*][1][3][1][*]</td><td>C toner sensor</td></tr>
<tr><td>[*][1][3][2][*]</td><td>Y toner sensor</td></tr>
<tr><td>[*][1][3][3][*]</td><td>BK toner sensor</td></tr>
</table></td><td>NO</td><td>Replace the toner sensor for which 0 is indicated on the display PCB.</td></tr>
<tr><td>DC controller PCB</td><td>YES</td><td>Replace the DC controller PCB.</td></tr>
</table>

V. JAM TROUBLESHOOTING

A. Jam

In the printer, paper can jam at the following areas.

① Paper pick-up unit
② Registration rollers, transfer drum
③ Separation and feeder units
④ Fixing and delivery units

troubleshooting procedures are described by location.

When paper jams, the printer indicates the location and type of jam by code numbers on the display PCB.

Code No.	Meaning
J30	Upper Cassette pick-up jam
J31	Lower cassette pick-up jam
J32	Registration roller jam
J33	Transfer drum jam
J34	Separation jam
J35	Stationary jam of delivery unit
J36	Delay jam of delivery unit.

Table 7-10

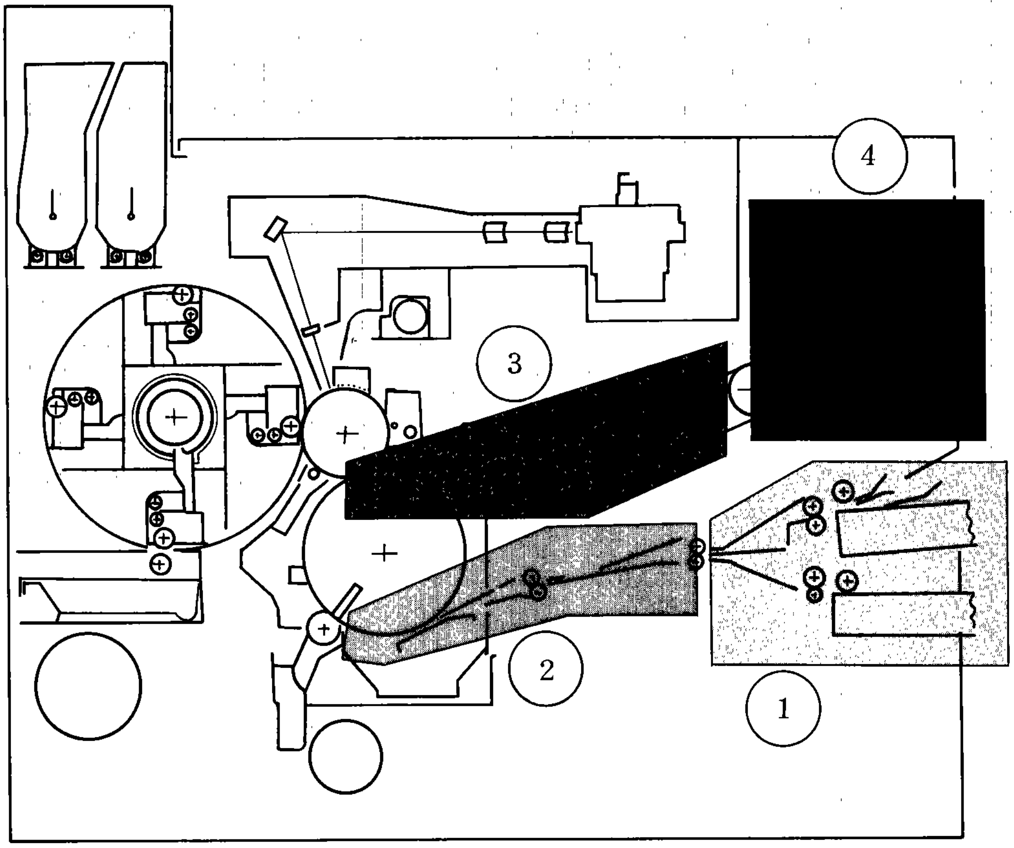


Figure 7-16

1. Paper pick-up unit

Location/type of fault	Step	Check	Result	Measure
	1	Did the jam occur in the cassette pick-up area?	NO	Go to step 8.
Cassette	2	Is the cassette installed correctly?	NO	Install the cassette correctly.
	3	Is the problem eliminated when another cassette is used?	YES	1. Check the side guide plate of the cassette. 2. Check the middle guide plate of the cassette.
Paper	4	Is the paper curled or wavy?	YES	Replace the copy paper. Explain to the user how to store paper correctly.
	5	Is the problem eliminated when Canon-approved paper is used?	YES	Advise the user to use Canon-approved paper.
DC controller PCB Pick-up roller clutch	6	Does the pick-up roller of the selected cassette holder rotate while copies are being made?	NO	Refer to "Paper is not picked up".
Pick-up roller	7	Is the paper pick-up roller deformed or worn out?	YES	Replace the paper pick-up roller.
Guide plate			NO	Check whether the guide plate is deformed.
Paper	8	Is the problem eliminated when Canon-approved paper is used?	YES	Advise the user to use Canon-approved paper.
Pick-up roller			NO	Check the paper pick-up roller for wear and deformation.

2. Registration rollers, transfer drum

Location/type of fault	Step	Check	Result	Measure
	1	Has the leading edge of the paper passed the registration rollers?	YES	Go to step 6.
Registration roller clutch	2	Is the registration roller clutch operating normally?	NO	Chech the registration roller clutch.
Fast-feed unit clutch	3	Is the fast-feed unit clutch operating normally?	NO	Check the fast-feed clutch.
Registration roller	4	Are the registration rollers deformed, worn, or marked?	YES	Clean the roller with alcohol if it is stained. Replace the roller if it is deformed or worn.
Feed roller clutch	5	Is the feed roller turning normally?	NO	Check the paper feed roller clutch.
Feed roller			YES	Check weather the paper feed roller is deformed or stained.
Paper guide plate cam clutch	6	Is the paper guide plate in the transfer drum assembly operating normally?	NO	Check the clutch.
Gripper solenoid	7	Is the gripper solenoid operating normally?	NO	Check the solenoid.
Gripper drive assembly	8	Does the gripper open correctly to grip copy paper?	NO	1. Check whether the cam operates normally. 2. Check that the gripper operation arm is not bent.
Transfer drum paper sensor (Q18)			YES	Check the sensor.

3. Separation and feeder units

Location/type of fault	Step	Check	Result	Measure
Gripper drive unit	1	Does the gripper open correctly?	NO	1. Check whether the cam operates normally. 2. Check that the gripper operation arm is not bent.
Separation claw cam clutch unit	2	Is the separation claw cam clutch operating normally?	NO	Check the clutch.
Claw spring	3	Can the separation claw be moved smoothly by hand?	NO	Check the installation of the spring.
Separation claw	4	Is the leading edge of copies crumpled?	YES	Copy paper may be contacting separation claw directly. Check the position of the separation claw.
Feeder drive unit	5	Is the feeder belt turning correctly?	NO	Check the feeder drive assembly.
Feeder fan	6	Is the feeder suction fan operating normally?	NO	Check the feeder fan.
Copy paper alignment			YES	Check whether copy paper on the transfer drum is fed and gripped at an angle (askew). If skew feed is observed, check the registration roller and the paper pick-up unit

4. Fixing and delivery units

Location/type of fault		Step	Check	Result	Measure
Separation claw of delivery assembly		1	Is the separation claw worn or deformed?	YES	1. Replace the separation claw. 2. If the separation claw is dirty, clean it with MEK.
		2	Is the separation claw positioned correctly?	NO	Adjust the position of the separation claw.
Fixing unit	Upper and lower fixing rollers	3	Are the upper and lower fixing rollers deformed or scratched?	YES	Replace the roller.
	Paper guide	4	Is the paper guide of the fixing assembly dirty?	YES	Clean the guide with MEK.
	Roller pressure	5	Is the lower fixing roller pressure (nip width) within tolerance?	NO	Adjust the pressure.
	Cleaning belt	6	Is the cleaning belt being taken up correctly?	NO	Check the fixing unit cleaning unit.
Thermistor		7	Is the surface of the thermistor dirty?	YES	Clean with MEK.
Lower fixing roller blade		8	Is the lower fixing roller blade dirty.?	YES	Clean the blade with MEK.
Feeder unit belt		9	Is the belt of the feeder unit dirty?	YES	Clean the belt.
Delivery unit	Delivery detection lever	10	Does the delivery unit paper sensor arm move smoothly?	NO	Adjust the arm so that it moves smoothly.
	Delivery unit sensor (Q4)	11	Is the delivery unit paper sensor functioning normally?	NO	Replace the sensor.
	Delivery roller drive unit	12	Do the delivery rollers rotate smoothly?	NO	Check the delivery roller drive unit.
Oil applying roller unit				YES	1. Check the operation of the oil-applying roller unit. 2. Check the supply of silicone oil.

B. Incomplete Paper Feed

1. Double feed

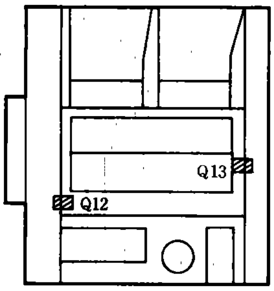
Location/type of fault	Step	Check	Result	Measure
Separation rollers	1	Are the separation rollers in the pick-up unit deformed or worn?	YES	Replace the separation rollers.
Springs			NO	Replace the springs for the separation rollers.

2. Wrinkles

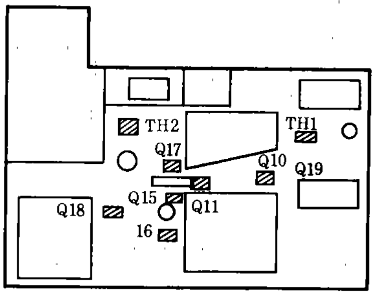
Location/type of fault		Step	Check	Result	Measure
Pick-up unit		1	Switch the power OFF while copy paper is passing through the feed rollers. Is the paper wrinkled? Is it being fed at an angle?	YES	Check the pick-up unit. Check the registration rollers.
Copy paper		2	Is the problem eliminated when copy paper from a new package is used?	YES	The paper may have absorbed water. Explain to the user how to store paper correctly.
		3	Is Canon-approved paper being used?	NO	Advise the user to use Canon-approved paper.
Fixing unit	Paper guide	4	Is foreign matter such as toner stuck to the paper guide?	YES	Clean the guide with MEK.
	Fixing roller pressure	5	Is the fixing roller pressure (nip width) within tolerance?	NO	Adjust the pressure.
	Upper and lower fixing rollers			YES	Try replacing the upper roller, then the lower roller, if necessary?

VI. ELECTRICAL COMPONENTS

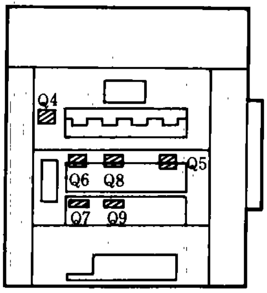
A. Sensors



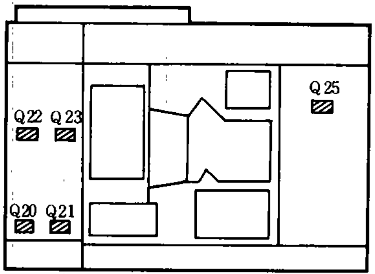
Left view



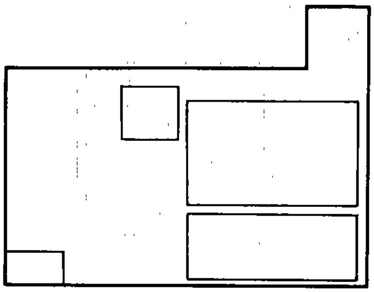
Front view



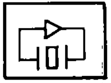
Right view



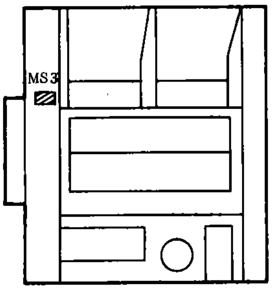
Top view



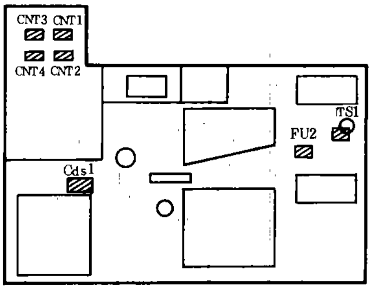
Rear view

Symbol	Description	Identification	Function
	Photointerrupter	Q4	Delivery sensor
		Q5	Manual feed unit paper
		Q6	Upper cassette paper sensor
		Q7	Lower cassette paper sensor
		Q8	Upper cassette lifter position sensor
		Q9	Lower cassette lifter position sensor
		Q10	Feed roller paper sensor
		Q11	Registration roller paper sensor
		Q12	Turret lock release sensor
		Q13	Turret home position sensor
		Q15	Image leading edge sensor
		Q16	Transfer drum home position sensor
		Q25	Remaining cleaning belt sensor
	Photoreflector	Q17	Separation unit paper sensor
		Q18	Transfer drum paper sensor
		Q19	OHP film sensor
	Toner sensor	Q20	Toner sensor in the yellow hopper
		Q21	Toner sensor in the magenta hopper
		Q22	Toner sensor in the cyan hopper
		Q23	Toner sensor in the black hopper
	Thermistor	TH1	Lower fixing roller temperature sensor
		TH2	Drum temperature sensor

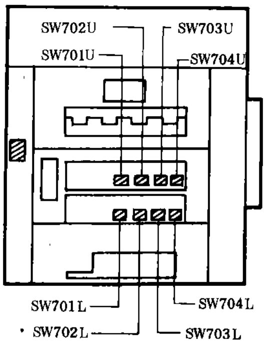
B. Sensors, Switches, Circuit Breakers, and Counters



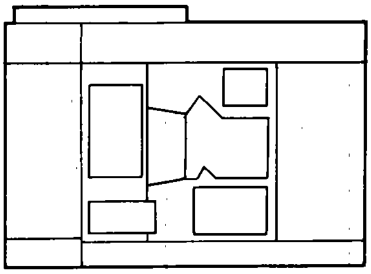
Left view



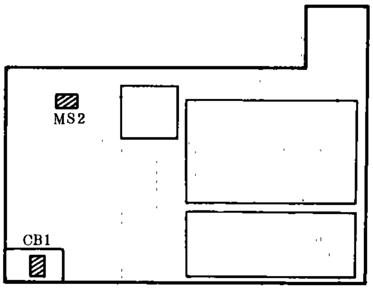
Front view



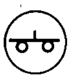
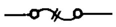
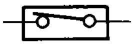
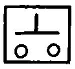
Right view



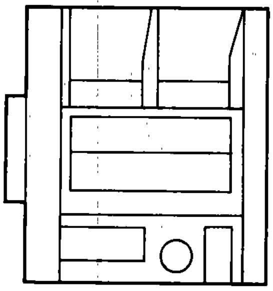
Top view



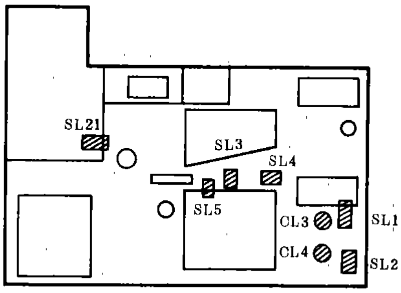
Rear view

Symbol	Description	Identification	Function
	Thermoswitch	TS1	Preventing damage from overheated fixing roller heater
	Thermal fuse	FU2	Preventing damage from overheated fixing roller heater
CB	Circuit breaker	CB1	Preventing damage from overheated fixing roller heater AC power overcurrent
	Microswitch/switch	MS1 MS2 MS3	TEST-PRINT switch Rear panel position sensor Left panel position sensor
	Pushbutton switch	SW701U SW702U SW703U SW704U SW701L SW702L SW703L SW704L	Upper cassette size sensor Upper cassette size sensor Upper cassette size sensor Upper cassette size sensor Lower cassette size sensor Lower cassette size sensor Lower cassette size sensor Lower cassette size sensor
CNT	Counter	CNT1 CNT2 CNT3 CNT4	Total copy counter Mono-color copy counter (R, G, B, Y, M, C) Full-color (3 color and 4-color) copy counter (large size) Full-color (3 color and 4-color) copy counter (small size)

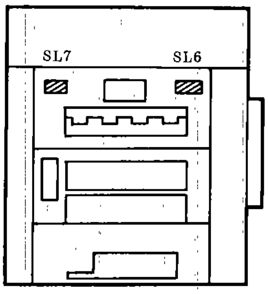
C. Clutches and Solenoids



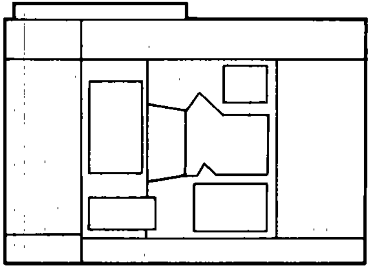
Left view



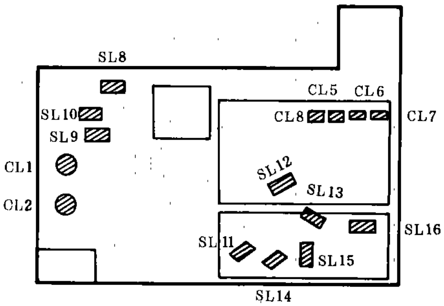
Front view



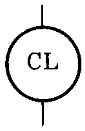
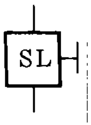
Right view



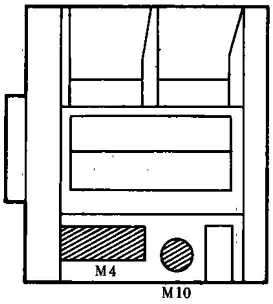
Top view



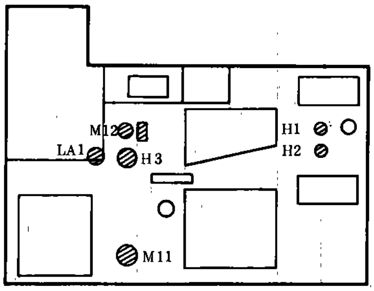
Rear view

Symbol	Description	Identification	Function
	Clutch	CL1	Upper cassette paper lifter clutch
		CL2	Lower cassette paper lifter clutch
		CL3	Upper pick-up roller clutch
		CL4	Lower pick-up roller clutch
		CL5	Magenta toner feed screw clutch
		CL6	Cyan toner feed screw clutch
		CL7	Yellow toner feed screw clutch
		CL8	Black toner feed screw clutch
	Solenoid	SL1	Upper pick-up roller engage solenoid
		SL2	Lower pick-up roller engage solenoid
		SL3	Fast-feed unit solenoid
		SL4	Feed roller clutch
		SL5	Registration roller clutch solenoid
		SL6	Oil-applying roller
		SL7	Cleaning belt winding solenoid
		SL8	Fixing roller speed-select solenoid
		SL9	Feeder drive unit solenoid 1
		SL10	Feeder drive unit solenoid 2
		SL11	Separation claw solenoid
		SL12	Gripper solenoid
		SL13	Transfer drum spacing solenoid
		SL14	Paper guide plate solenoid
		SL15	Cleaning brush solenoid
		SL16	Turret lock release solenoid
		SL21	Filter change solenoid

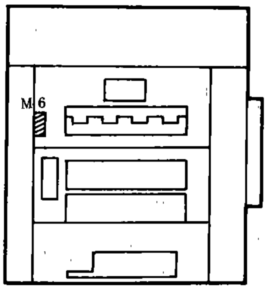
D. Lamps, Heaters, and Motors



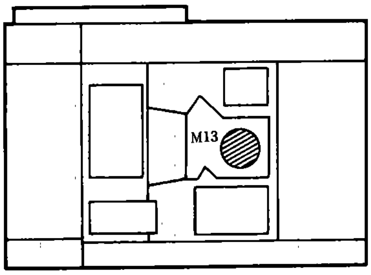
Left view



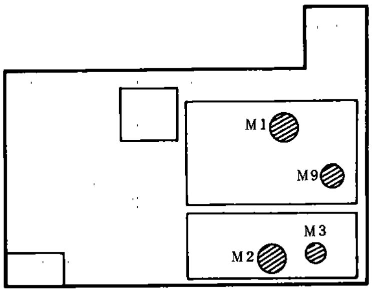
Front view



Right view



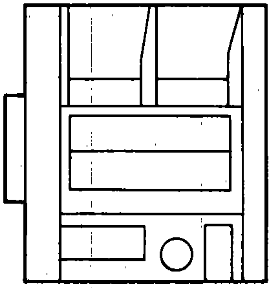
Top view



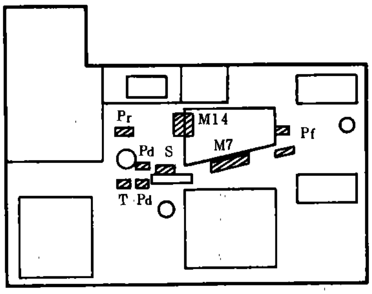
Rear view

Symbol	Description	Identification	Function
	Lamp	LA 1	For toner concentration sensing
		LSA 1	Preconditioning exposure lamp
	Heater	H1	Fixing roller heater (upper)
		H2	Fixing roller heater (lower)
		H3	Drum heater
M	Motor	M1	Drum motor
		M2	Main motor
		M3	Developing unit drive motor
		M4	Turret motor
		M6	Cleaning belt winding motor
		M9	Toner dust collecting fan motor 1
		M10	Toner dust collecting fan motor 2
		M11	Cleaning brush motor
		M12	Corona wire cleaning unit motor
		M13	Scanning mirror drive motor

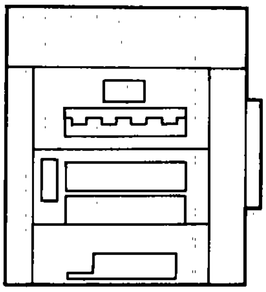
E. Fan Motors and Others



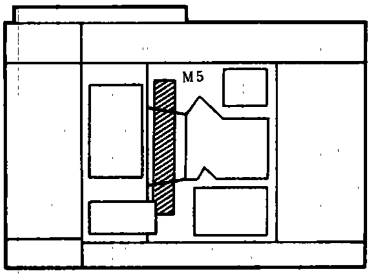
Left view



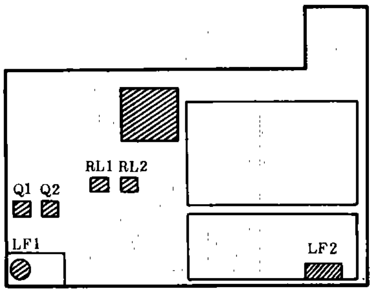
Front view



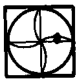
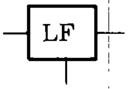
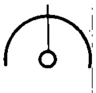
Right view



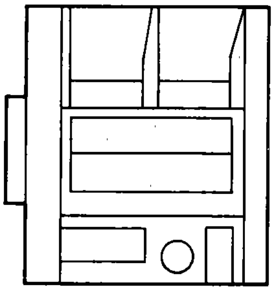
Top view



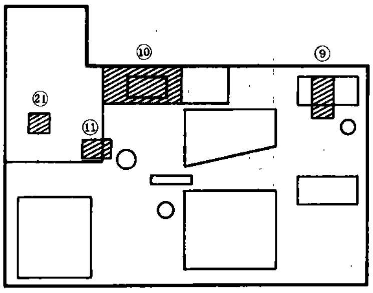
Rear view

Symbol	Description	Identification	Function
	Fan/motor	M5 M7 M8 M14	Primary corona assembly fan Feeder fan Exhaust fan Inner exhaust fan
	Line filter	LF1 LF2	For eliminating electrical noise For eliminating electrical noise
	Corona unit	Pr T Pd S Pf	Primary corona Transfer corona Static charge eliminating corona Separation corona Pre-fixing corona
	Triac	Q1 Q2	For the upper fixing heater For the lower fixing heater
	Relay	RL1 RL2	

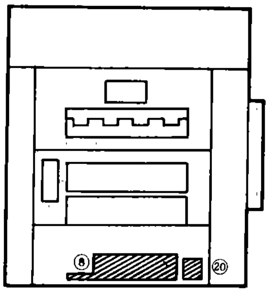
F. PCB



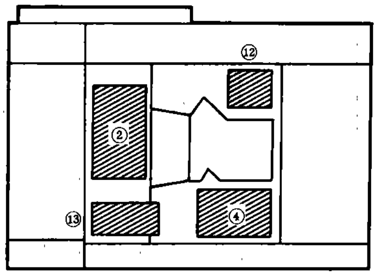
Left view



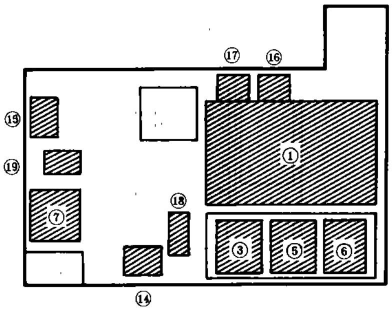
Front view



Right view



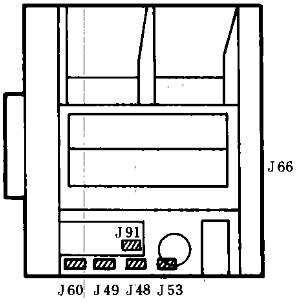
Top view



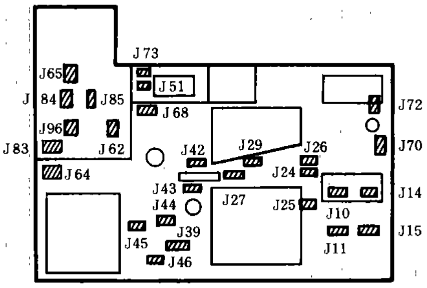
Rear view

Symbol	Description	Function
①	DC controller PCB	Controls operations.
②	DC driver PCB	Drives DC loads.
③	Motor driver PCB	Drives the main motor and the drum motor.
④	Scanner driver PCB	Drives the scanning mirror drive motor.
⑤	Turret motor controller PCB	Controls the turret motor.
⑥	Turret motor driver PCB	Drives the turret motor.
⑦	AC driver PCB	Controls AC loads.
⑧	DC power supply PCB (PU1)	Supplies power to the copier.
⑨	Remaining oil sensor PCB	Detects the amount of silicone oil remaining.
⑩	Display PCB	Indicates machine conditions.
⑪	Toner concentration sensor PCB	Detects the amount of toner in the developing assembly.
⑫	Drum surface potential control PCB	Controls the surface potential of the photosensitive drum.
⑬	Drum surface potential measuring PCB	Measures the surface potential of the photosensitive drum.
⑭	High voltage transformer HVT-DC1	Supplies high voltage for the transfer corona.
⑮	High voltage transformer HVT-DC2	Supplies high voltage for the primary and pre-fixing corona.
⑯	High voltage transformer HVT-DC3	Supplies high voltage for the developing bias.
⑰	High voltage transformer HVT-DC4	Supplies high voltage for primary corona grid bias.
⑱	High voltage transformer HVT-AC1	Supplies high voltage for the separation corona.
⑲	High voltage transformer HVT-AC2	Supplies high voltage for the static charge eliminating corona.
⑳	DC power supply PCB (PU2)	Supplies power to the copier.
㉑	Environment sensor PCB	Measures the conditions inside the copier.

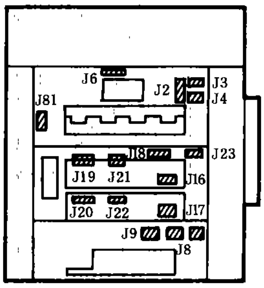
G. Connectors


J91
J66
J60
J49
J48
J53

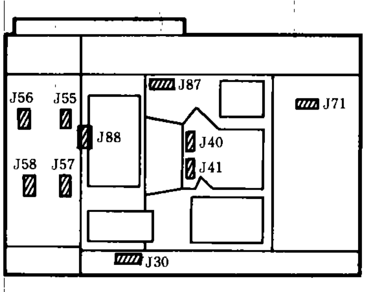
Left view


J73
J65
J
84
J85
J51
J72
J96
J68
J83
J62
J42
J29
J26
J70
J64
J24
J43
J44
J27
J25
J14
J10
J39
J45
J46
J11
J15

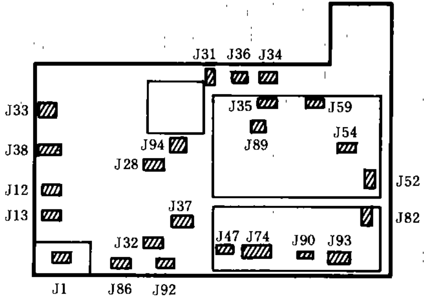
Front view


J6
J2
J3
J4
J81
J18
J23
J19
J21
J16
J20
J22
J17
J9
J8

Right view


J87
J71
J56
J55
J88
J40
J58
J57
J41
J30

Top view


J31
J36
J34
J33
J35
J59
J89
J54
J38
J94
J28
J52
J12
J37
J13
J82
J32
J47
J74
J90
J93
J1
J86
J92

Rear view

Identification	No. of pins	Connection
J1	4	Input power supply
J2	5	Fixing unit
J3	4	Thermistor in fixing unit (TH1)
J4	6	Cleaning belt winding solenoid (SL7)
J6	2	Oil-applying roller solenoid (SL6)
J8	15	Cassette holder
J9	9	Cassette holder
J10	2	Upper pick-up roller clutch (CL3)
J11	2	Lower pick-up roller clutch (CL4)
J12	3	Upper cassette paper lifter clutch (CL1)
13	3	Lower cassette paper lifter clutch (CL2)
J14	3	Upper pick-up roller engage solenoid (SL1)
J15	3	Lower pick-up roller engage solenoid (SL2)
J16	6	Upper cassette size sensor PCB
J17	6	Lower cassette size sensor PCB
J18	3	Manual feed unit paper sensor (Q5)
J19	3	Upper cassette paper sensor (Q6)
J20	3	Lower cassette paper sensor (Q7)
J21	3	Upper cassette lifter position sensor (Q8)
J22	3	Lower cassette lifter position sensor (Q9)
J23	9	Registration unit
J24	3	OHP film sensor (Q19)
J25	3	LED for OHP film sensor
J26	3	Feed roller paper sensor (Q10)
J27	3	Registration roller paper sensor (Q11)
J28	4	Feeder
J29	2	Feeder fan (M7)
J30	2	Primary corona fan (M5)
J31	2	Exhaust fan (M8)
J32	8	HVT-DC1
J33	8	HVT-DC2
J34	5	HVT-DC3
J35	3	HVT-DC3
J36	5	HVT-DC4
J37	4	HVT-AC1
J38	4	HVT-AC2
J39	12	Transfer drum
J40	3	Image leading edge sensor (Q15)
J41	3	Transfer drum home position sensor (Q13)
J42	3	Separation unit paper sensor (Q17)
J43	3	LED for separation unit paper sensor
J44	3	Transfer drum paper sensor (Q18)
J45	3	LED for transfer drum paper sensor
J46	2	Cleaning brush motor (M11)
J47	6	Transfer drum solenoids'
J48	6	To SW5
J49	2	Developing unit drive motor (M3)
J51	3	Preconditioning exposure lamp (LAS1)
J52	3	Turret lock release sensor (Q12)
J53	2	Toner dust collecting motor (M10)
J54	2	Toner dust collecting motor (M9)
J55	3	Toner sensor in the Y hopper (Q23)
J56	3	Toner sensor in the M hopper (Q22)
J57	3	Toner sensor in the BK hopper (Q21)
J58	3	Toner sensor in the C hopper (Q20)
J59	6	To the toner feed screw clutch solenoids'
J60	3	Turret motor (M4)

Identification	No. of pins	Connection	Identification	No. of pins	Connection
J62	2	Lamp for toner/concentration sensor (LA1)	J83	2	Jam reset switch (SW6)
			J84	6	Y and C hoppers
J64	6	Excess waste toner sensor	J85	8	M and BK hoppers
J65	7	Counter	J86	9	DC power supply PCB (PU1)
J66	3	Turret home position sensor (Q13)	J87	9	DC power supply PCB (PU1)
J68	2	Corona wire cleaning unit motor (M12)	J88	9	AC driver PCB-DC controller PCB
			J89	6	Drum motor (M1)
J70	4	Control keys	J90	6	Main motor (M2)
J71	3	Remaining cleaning belt sensor (Q25)	J91	5	Turret motor (M4)
J72	2	Power switch ON Indicator (LED1)	J92	6	DC power supply PCB (PU2)
J73	2	Thermistor 2 (TH2)	J93	2	Noise filter (NF2)
J74	12	Transfer drum	J94	3	Intake fan (M14)
J81	2	Cleaning belt winding motor (M6)	J95	3	DC power supply PCB (PU2)
J82	5	Turret lock unit	J96	5	Environment sensor PCB

H. List of VRs, LEDs, and checkpins by PCB

The following lists include only the VRs, LEDs, and checkpins used in field servicing.

> VRs and checkpins not listed below are used only at the factory. Adjustment and checking of these parts requires special tools and high-precision measuring equipment. Do not touch them during servicing.

Notes:

1. Some LEDs may glow slightly when they should be OFF due to leakage current.
2. VR that may be adjusted .... ●

   VR that may not be adjusted .. ⊘

1. DC controller PCB

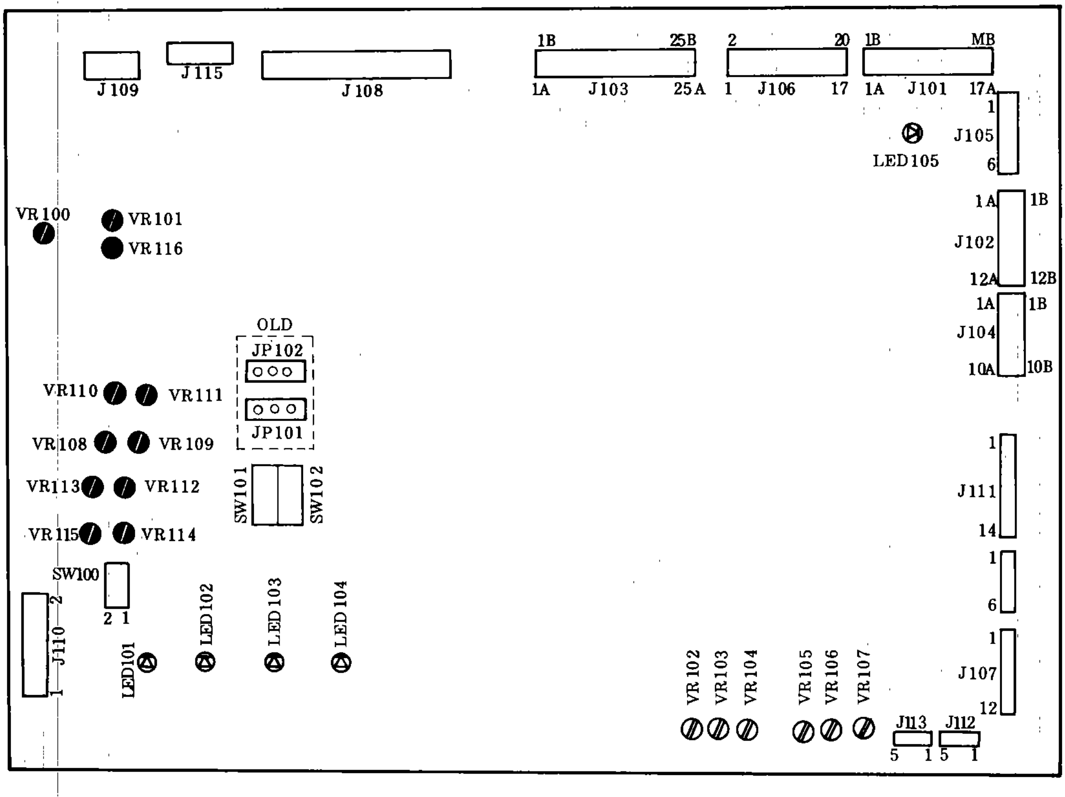

J109
J115
J108
1B
25B
1A
J103
25A
2
20
1
J106
17
1B
MB
1A
J101
17A
1
J105
6
LED105
1A
1B
J102
12A
12B
1A
1B
J104
10A
10B
VR100
VR101
VR116
OLD
JP102
JP101
VR110
VR111
VR108
VR109
VR113
VR112
VR115
VR114
SW101
SW102
SW100
2 1
J110
2
1
LED101
LED102
LED103
LED104
1
J111
14
1
6
1
J107
12
VR102
VR103
VR104
VR105
VR106
VR107
J113
J112
5 1 5 1

Figure 7-17

VR	Adjustment
VR100	For laser power adjustment
VR101	For laser power adjustment
VR108	For laser adjustment
VR109	For laser adjustment
VR110	For laser adjustment
VR111	For laser adjustment
VR112	For laser adjustment
VR113	For laser adjustment
VR114	For laser adjustment
VR115	For laser adjustment
VR116	For laser power adjustment

Table 7-11 VRs on the DC controller PCB

LED	Remarks
LED101	ON when +5 V is being supplied.
LED102	ON when +12 V is being supplied.
LED103	ON when −5 V is being supplied.
LED104	ON when −12 V is being supplied.
LED105	ON when +5 V is being supplied.

Table 7-12 LEDs on the DC controller PCB

SW	Function/remarks
SW100-1	For laser adjustment
SW100-2	For selecting the laser adjustment

Table 7-13 SWs on the DC controller PCB

SW101 SW102	OFF ...... Normal See 7-5P

Note: JP107
The purpose of jumper-connector JP107 on the DC controller is to enable the microprocessor to tell if the machine is using an A, B system (metric paper size) cassette or a letter, ledger system cassette, so that paper feed operation will suit the length of the sheets. Consequently, when replacing a DC controller PCB of one of these machines, remove JP107 from the old DC controller PCB and use it on the new one.

2. DC driver PCB

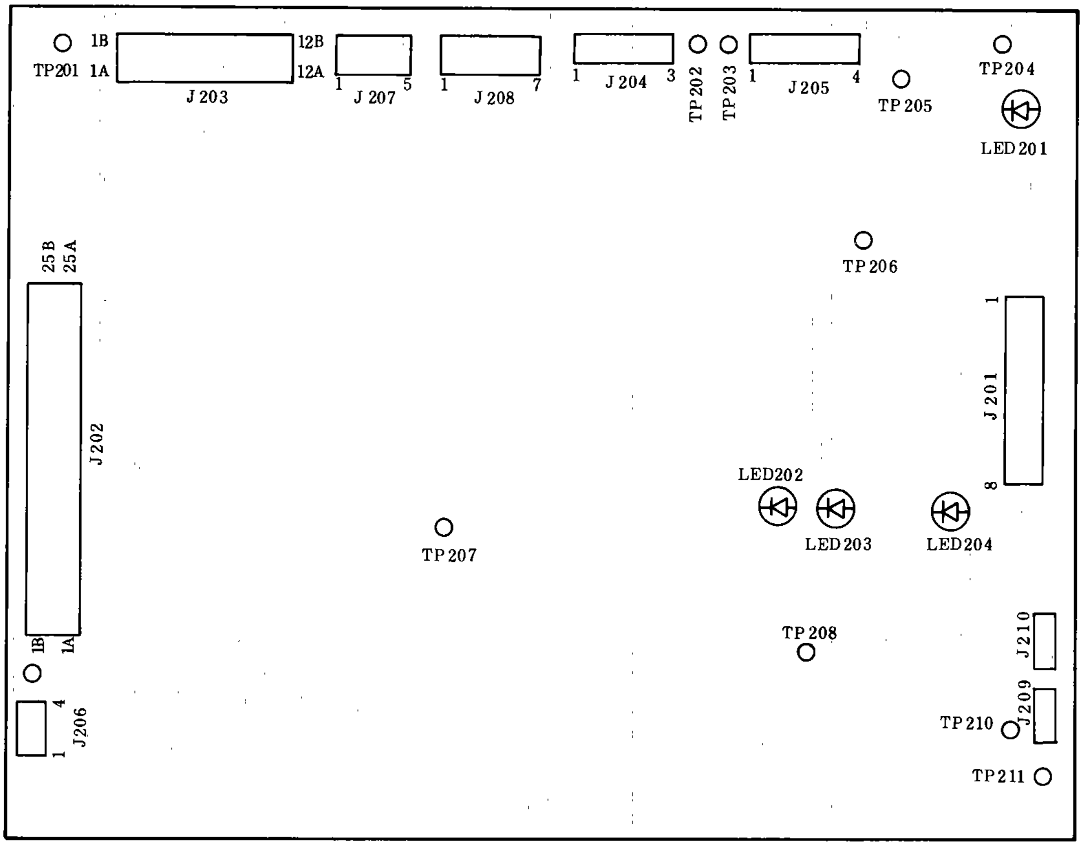

TP201
1B
1A
J203
12B
12A
1
5
J207
1
7
J208
1
J204
3
TP202
TP203
1
J205
4
TP205
TP204
LED201
TP206
25B
25A
J202
1
J201
8
LED202
LED203
LED204
TP207
TP208
J210
J209
TP210
TP211
1B
1A
4
1
J206

Figure 7-18

LED	Remarks
LED201	ON when +24 V is element supplied.
LED202	ON when Peltier element temperature is correct.
LED203	ON when +5 V is being supplied.
LED204	ON when −5 V is being supplied.

Table 7-14 LEDs on the DC driver PCB

Checkpin	Function
TP201	GND
TP202	Thermistor voltage
TP203	GND
TP204	GND
TP205	Input voltage to Q202-6
TP206	Output voltage of Q202-7
TP208	Peltier element drive voltage
TP209	GND
TP210	Output voltage of Q128-7
TP211	GND

Table 7-15 Checkpins on the DC driver PCB

3. AD driver PCB

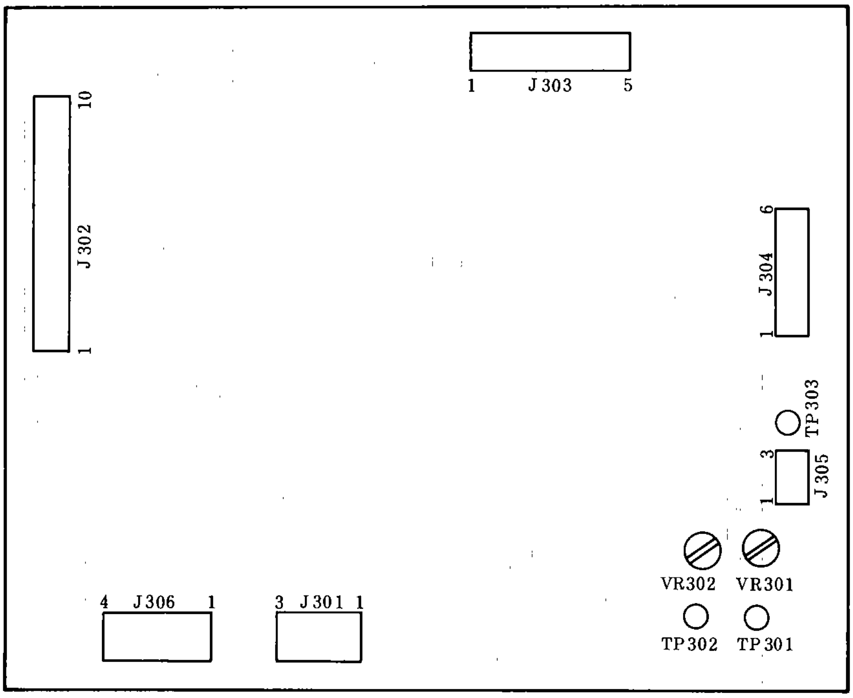

1 J303 5
10
J302
1
6
J304
1
TP303
3
J305
1
VR302 VR301
TP302 TP301
4 J306 1
3 J301 1

Figure 7-19

4. Toner concentration sensor PCB

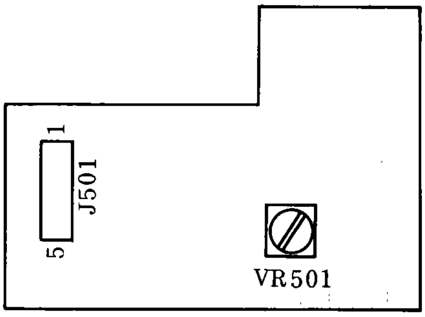

1
J501
5
VR501

Figure 7-20

5. Drum surface potential measuring PCB

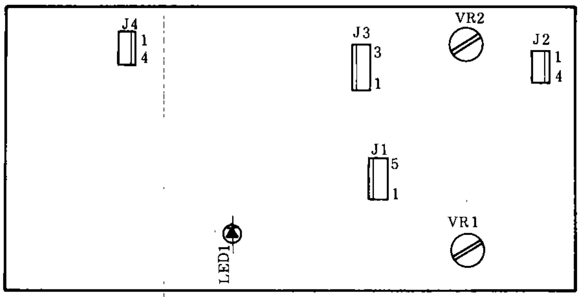

J4
1
4
J3
3
1
VR2
J2
1
4
J1
5
1
VR1
LED1

Figure 7-21

LED	Indication
LED1	LED ON when potential sensor operation is normal

Table 7-16 LED on the drum surface potential measuring PCB

6. Drum surface potential controller PCB

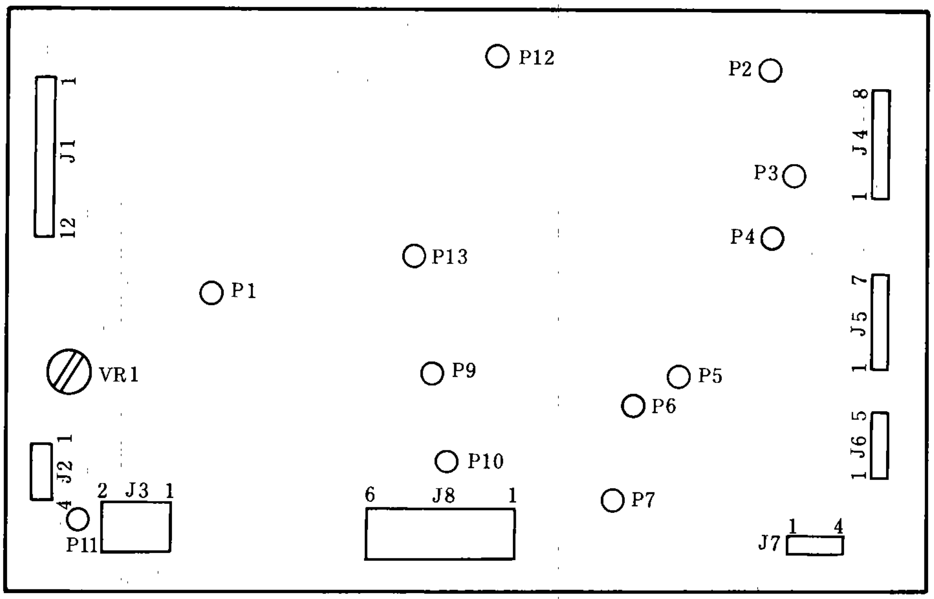

P12
P2
P3
P4
P13
P1
VR1
P9
P5
P6
P10
P7
P11
J1
1
12
J4
8
1
J5
7
1
J6
5
1
J2
1
4
J3
2
1
J8
6
1
J7
1
4

Figure 7-22

Checkpin	Function
P1	For checking the drum surface potential
P2	For checking the static charge eliminating corona DC control voltage
P3	For checking the transfer corona control voltage
P4	For checking the primary corona control voltage
P5	For checking the developing bias DC control voltage
P6	For checking the separation corona control voltage
P7	For checking the grid bias control voltage
P9	For checking +13.5 V
P10	For checking +9.6 V
P11	GND
P12	For checking +5 V
P13	For checking +5 V

Table 7-17 Checkpins on the drum surface potential controller PCB

7. Display PCB

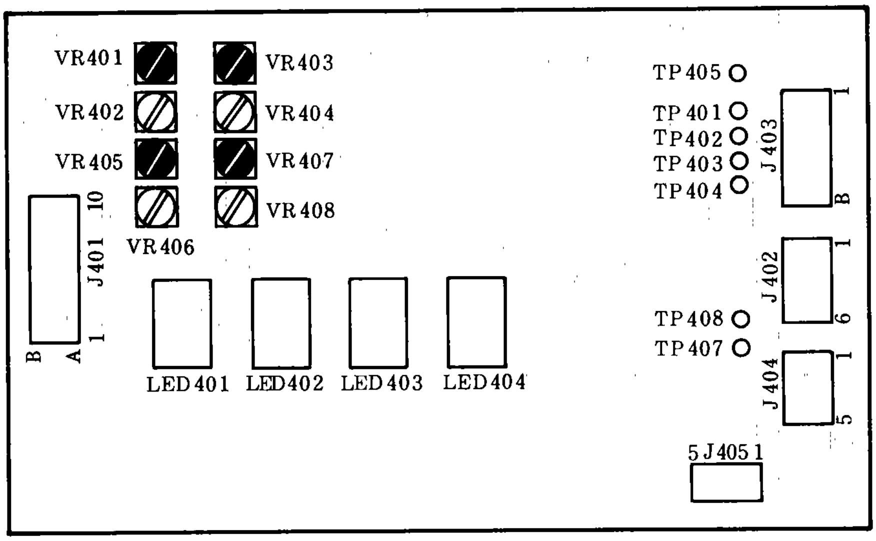

VR401
VR403
VR402
VR404
VR405
VR407
VR406
VR408
J401
10
1
B
A
LED401
LED402
LED403
LED404
TP405
TP401
TP402
TP403
TP404
J403
1
B
J402
1
6
TP408
TP407
J404
1
5
5 J405 1

Figure 7-23

VR	Function
VR401	Y developer concentration adjustment
VR403	M developer concentration adjustment
VR405	C developer concentration adjustment
VR407	BK developer concentration adjustment

Table 7-18 VRs on the display PC board

LED	Indication
LED401	Target contrast in M developing (manual setting)
LED402	Target contrast in C developing (manual setting)
LED403	Target contrast in Y developing (manual setting)
LED404	Target contrast in BK developing (manual setting)

Note:
The above 1-segment displays are used in the SERVICE mode and for C-, J-, and E-code indications

Table 7-19 LEDs on the display PCB

Checkpin	Function
TP401	To check the Y developer concentration sensor voltage
TP402	To check the M developer concentration sensor voltage
TP403	To check the C developer concentration sensor voltage
TP404	To check the BK developer concentration sensor voltage
TP405	GND
TP407	TP408

Table 7-20 Checkpins on the display PCB

8. HVT - DC1

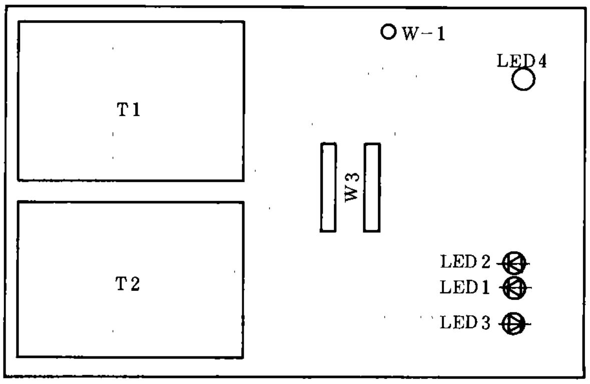

W-1
LED4
T1
W3
T2
LED2
LED1
LED3

Figure 7-24

LED	Indication
LED1	Not used.
LED2	Glows brighter when $\overline{HVTP} = 0$.
LED3	Not used.
LED4	Glows brighter as the output of the transfer corona increases.

Table 7-21 LEDs on HVT-DC1

9. HVT - DC2

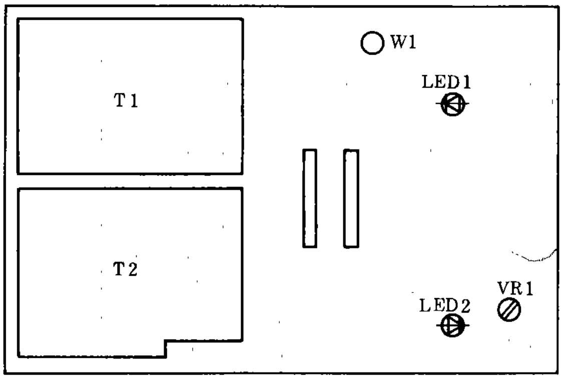

W1
LED1
T1
T2
VR1
LED2

Figure 7-25

LED No.	Indication
LED1	Glows brighter as the output of the primary corona increases.
LED2	Glows brighter as the output of the pre-fixing corona increases.

Table 7-22 LEDs on HVT-DC2

10. HVT - DC3

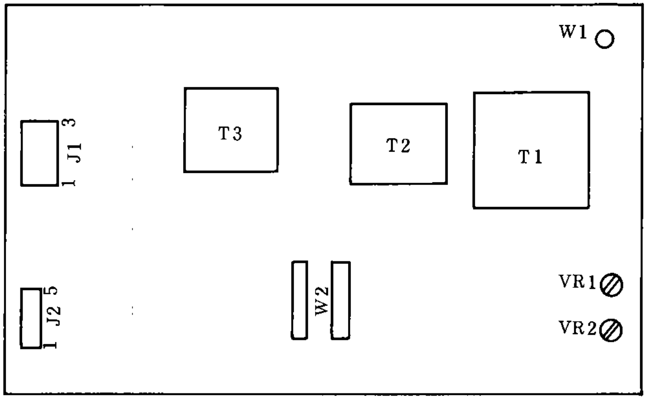

W1
1 J1 3
T3
T2
T1
1 J2 5
W2
VR1
VR2

Figure 7-26

11. HVT - DC4

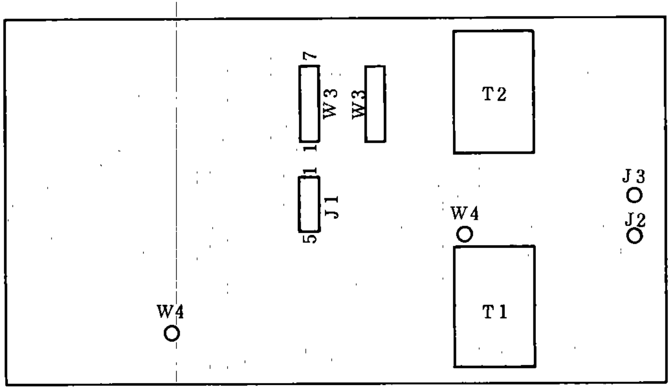

7
W3
1
W3
T2
1
J1
5
J3
W4
J2
T1
W4

Figure 7-27

12. HVT - AC1, HVT - AC2

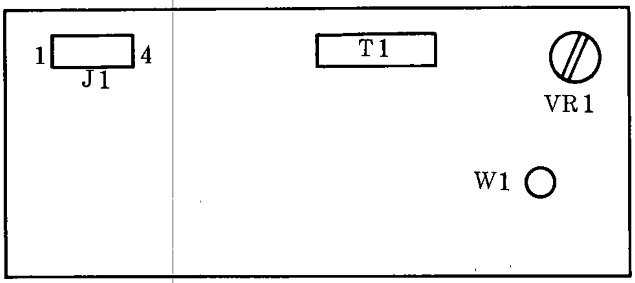

1
4
J1
T1
VR1
W1

Figure 7-28

13. Environment sensor PCB

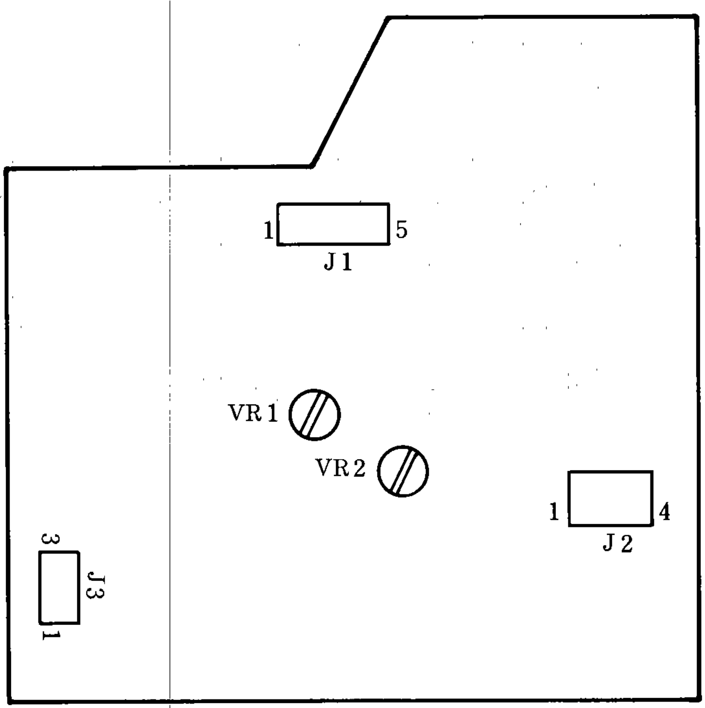

1
5
J1
VR1
VR2
1
4
J2
3
J3
1

Figure 7-29

14. Main and drum motor driver PCB

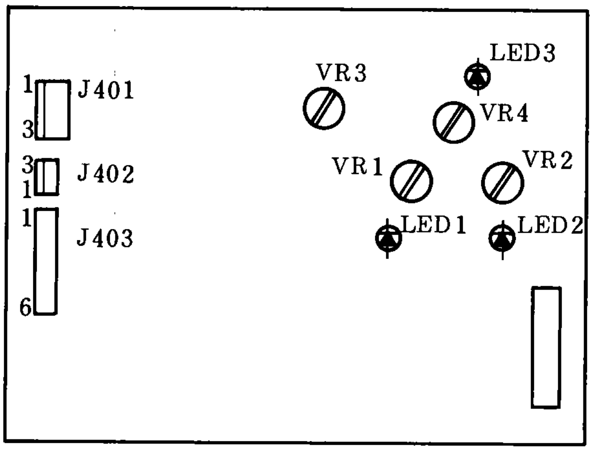

J401
1
3
J402
3
1
J403
1
6
VR3
LED3
VR4
VR1
VR2
LED1
LED2

Figure 7-30

LED	Indication
LED1	ON when the drum motor is rotating at the correct speed.
LED2	ON when the main motor is rotating at the correct speed.
LED3	ON when either the drum motor or the main motor is overloaded.

Table 7-23 LEDs on the motor driver PCB

15. Scanner mirror motor driver PCB

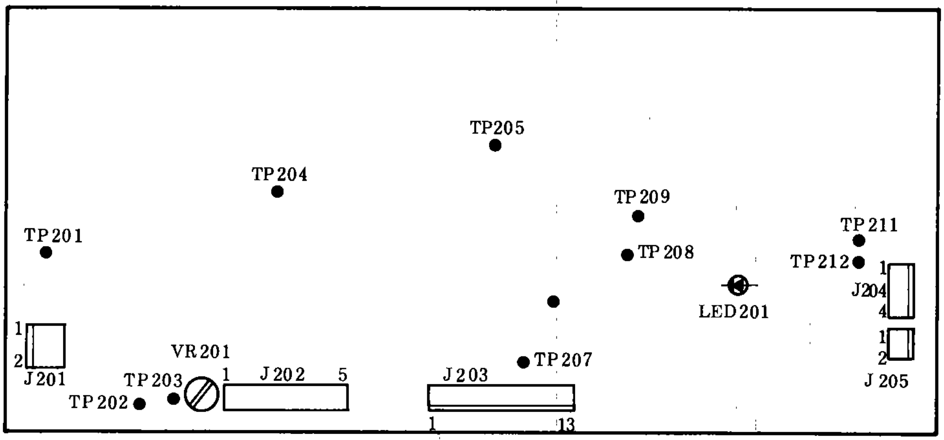

TP205
TP204
TP209
TP201
TP211
TP208
TP212
J204
1
4
LED201
1
2
J205
1
2
J201
VR201
TP203
1
J202
5
TP202
J203
1
13
TP207

Figure 7-31

LED	Indication
LED201	ON when the scanning mirror motor is rotating at the correct speed. (SCNRDY=0)

Table 7-24 LED on the scanner mirror motor driver PCB

Checkpin	Check
TP201	OV (GND)
TP202～212	For factory use only

Table 7-25 Checkpins on the scanning mirror motor driver PCB

16. Remaining oil sensor PCB

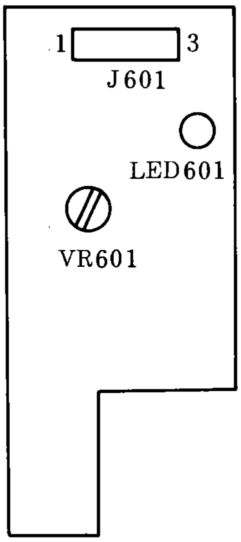


Figure 7-32

LED	Indication
LED601	ON when no oil is left.

Table 7-26 LED on the remaining oil sensor PCB

VII. SERVICE MODES

A. Operations In The SERVICE Modes

The 4 printer SERVICE modes listed below are available. Each is selected and used in a similar manner, as described immediately below. The individual modes are described in following sections.

No.	Mode
⧆1⧆	DISPLAY mode
⧆3⧆	ADJUSTMENT mode
⧆4⧆	SWITCH mode
⧆6⧆	COUNTER READING mode

Table 7-27

The operations of the printer and scanner SERVICE modes are performed independently.

1) Open the front door and remove the front inner cover.
2) Insert the door switch actuating tool into the door switch unit.
   Set the paper size, reproduction ratio, etc., if adjustments are to be made during copying operation.
3) Press the keys required to select the desired SERVICE mode (see Table 7-27).

   Example: ⧆ → 3 → ⧆

4) Select the address for the desired reading, test, adjustment, etc.

   Example: ⧆ → 1 → 2 → 3 → ⧆

5) Perform the check, adjustment, etc.
   - A copy operation will be performed in any setting if the TEST PRINT key is pressed.
   - To exit the SERVICE mode, press C twice.

B. DISPLAY Mode

1. Press ⊠□□□⊠ to select the desired address.
   └─ address

   The display will have the following format:

   [L]□□□[0]
   └"0", "1" or data values are displayed.

   Press [INV] to display the address.
2. Press [+/−] to increment the selected address.
   - Press [+/−] while pressing the [INV] key to decrement the selected address.
3. Press [C] to exit the DISPLAY Mode.

Address	Display	Connector No.	Signal name	Remarks
L100	CONTROL KEY SENSOR SIGNAL	J101-9B	KEYL	0: Control key is in place.
L101	Front door and delivery door position sensor			1: Door is closed.
L102	Unused			
L103	Left and rear panel position sensor	J102-12A	RCVRC	0: Panel is closed.
L104	TEST PRINT key signal	J101-10A	TPRT	0: Switch is pressed.
L105	JAM RESET key signal	J114-5	JRST	0: Switch is pressed.
L106	Communications with potential control PCB	–	–	Press the TEST PRINT key. 1: Communication with potential control PCB is normal.
L107	Communications with potential control PCB	–	–	Press the TEST PRINT key. 1: Communication with potential control PCB is normal.
L108	Unused	–	–	
L109	Unused	–	–	
L110	Unused	–	–	
L111	Unused	–	–	
L112	Unused	–	–	
L113	Unused	–	–	
L114	Fixing roller heater temperature sensor	–	–	0: Fixing roller temperature is above 190°C.
L115	Unused	–	–	
L116	Fixing roller thermistor continuity sensor	J101-6A	–	0: Connector is connected.
L117	Unused	–	–	
L118	Unused	–	–	
L119	Unused	–	–	
L120	COMMAND LINE BUSY signal	J108-29	CBSY	1*: Serial signal being outputted
L121	PRINT signal	J108-37	PRIN	1*: PRINT command being sent from image scanner.
L122	Unused	–	–	
L123	Controller power ready signal	J108-36	CPRDY	0: When communications with Image Scanner are enabled.
L124	BD signal	–	BDRDY	0: BD signal OK.
L125	BD signal error	–	BDERR	0: BD signal fault.
L126	Peltier element ready	–	PLTRDY	0: Peltier element functioning correctly.

* Make a copy using the Image Scanner and check the indication.

Address	Display	Connector No.	Signal name	Remarks
L127	Scanning mirror ready	–	SCNRDY	0: Scanning mirror speed correct.
L128	Unused	–	–	
L129	Unused	–	–	
L130	MAGENTA TONER OUT signal (Q21)	J114-9	$\overline{\text{MTEP}}$	0: No toner.
L131	CYAN TONER OUT signal (Q22)	J114-6	$\overline{\text{CTEP}}$	0: No toner.
L132	YELLOW TONER OUT signal (Q20)	J114-7	$\overline{\text{YTEP}}$	0: No toner.
L133	BLACK TONER OUT signal (Q23)	J114-8	$\overline{\text{BKTEP}}$	0: No toner.
L134	Turret is about to stop	J102-10A	–	0: Turret is about to STOP.
L135	Turret has stopped	J102-9A	–	0: Turret has stopped.
L136	Turret motor overcurrent detectionsignal	J102-3B	MOL	0: Overcurrent detected.
L137	Unused	–	–	
L138	Unused	–	–	
L139	Unused	–	–	
L140	TURRET HOME POSITION signal (Q13)	J102-10B	RHP	1: At the home position.
L141	TURRET LOCK SENSOR signal (Q12)	J102-8B	$\overline{\text{RLP}}$	1: Turret is locked.
L142	DEVELOPING MOTOR DRIVE signal	–	–	0: During reverse rotation.
L143	OIL OUT signal	J114-11	$\overline{\text{OEP}}$	0: No silicone oil.
L144	CLEANING BELT OUT signal (Q25)	J101-15B	$\overline{\text{CBOUT}}$	0: No cleaning belt left.
L145	COUNTER signal	–	–	1: Counter disconnected.
L146	Unused	–	–	
L147	Unused	–	–	
L148	Unused	–	–	
L149	Unused	–	–	
L150	UPPER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-1A	UCSZ3	1: SW704U ON.
L151	UPPER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-2A	UCSZ2	1: SW703U ON.
L152	UPPER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-3A	UCSZ1	1: SW702U ON.
L153	UPPER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-4A	UCSZ0	1: SW701U ON.
L154	LOWER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-5A	LCSZ3	1: SW704L ON.
L155	LOWER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-6A	LCSZ2	1: SW703L ON.
L156	LOWER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-7A	LCSZ1	1: SW702L ON.
L157	LOWER CASSETTE SIZE IDENTIFICATION SWITCH signal	J101-8A	LCSZ0	1: SW701L ON.
L158	Unused	–	–	
L159	Unused	–	–	
L160	Upper cassette paper out sensor (Q6) signal	J101-1B	$\overline{\text{UPEP}}$	0: Paper out.

Address	Display	Connector No.	Signal name	Remarks
L161	Lower cassette paper out sensor (Q7) signal	J101-2B	$\overline{\text{LPEP}}$	0: Paper out.
L162	Feed roller paper sensor (Q10) signal	J101-10A	PDP1	1: Paper present.
L163	Registration roller paper sensor (Q11) signal	J101-11A	PDP2	1: Paper present.
L164	Upper cassette lifter position sensor (Q8) signal	J101-3B	ULFTP	1: Lifter raised.
L165	Lower cassette lifter position sensor (Q9) signal	J101-4B	LLFTP	1: Lifter raised.
L166	Manual feed unit paper sensor (Q5) signal	J101-5B	MFS	1: Manual feed selected.
L167	Delivery unit paper sensor (Q4) signal	J101-8B	$\overline{\text{PDP5}}$	0: Paper present.
L168	Unused	–	–	
L169	Unused	–	–	
L170	DRUM MOTOR (M1) SPEED SENSOR signal	J102-4B	–	0: Motor running at correct speed.
L171	MAIN MOTOR (M2) SPEED SENSOR signal	J102-5B	–	0: Motor running at correct speed.
L172	TRANSFER DRUM HOME POSITION SENSOR (Q16) signal	J104-3B	$\overline{\text{TDHP}}$	0: Drum home position.
L173	IMAGE EDGE LEADING SENSOR (Q15) signal	J104-2B	$\overline{\text{ILEG}}$	0: Light-blocking plate is inside sensor.
L174	SEPARATION UNIT PAPER SENSOR (Q17) signal	J104-6B	PDP4	1: Paper present.
L175	TRANSFER DRUM PAPER SENSOR (Q18) signal	J104-7B	PDP3	1: Paper present.
L176	WASTE TONER SENSOR signal	J114-1	WTOFP	1: Waste toner receptacle full.
L177	OHP FILM SENSOR (Q19) signal	J101-9A	$\overline{\text{OHPDP}}$	0: OHP film is detected.
L178	Unused	–	–	
L179	Unused	–	–	

Address	Display	Remarks
L200	Contrast potential while M developing	
L201	Contrast potential while C developing	
L202	Contrast potential while Y developing	
L203	Contrast potential while BK developing	
L204	V back voltage while M developing	
L205	V back voltage while C developing	
L206	V back voltage while Y developing	
L207	V back voltage while BK developing	
L208	Unused	
L209	Unused	
L210	Dark area measured VD1 potential	
L211	Light area measured VL1 potential	
L212	Dark area measured VD2 potential	
L213	Light area measured VL2 potential	
L214	Drum surface potential	
L215	Copier environment sensor signal 1	
L216	Copier environment sensor signal 2	
L217	Unused	
L218	Unused	
L219	Unused	
L220	M development VD target value	
L221	C development VD target value	
L222	Y development VD target value	
L223	BK development VD target value	
L224	M development VL target value	
L225	C development VL target value	
L226	Y development VL target value	
L227	BK development VL target value	
L228	Unused	
L229	Unused	
L230	M development grid bias	
L231	C development grid bias	
L232	Y development grid bias	
L233	BK development grid bias	
L234	M development developing bias	
L235	C development developing bias	
L236	Y development developing bias	
L237	BK development developing bias	
L238	Unused	
L239	Unused	
L240	Reference value of M developer feed signal (when first filled)	
L241	Reference value of C developer feed signal (when first filled)	
L242	Reference value of Y developer feed signal (when first filled)	
L243	Reference value of BK developer feed signal (when first filled)	
L244	Reference value of M developing unit (when first filled)	

Address	Display	Remarks
L245	Reference value of C developer unit (when first filled)	
L246	Reference value of Y developer unit (when first filled)	
L247	Reference value of BK developer unit (when first filled)	
L248	Unused	
L249	Unused	
L250	Reference value of concentration of M developer (when first filled)	
L251	Reference value of concentration of C developer (when first filled)	
L252	Reference value of concentration of Y developer (when first filled)	
L253	Reference value of concentration of BK developer (when first filled)	
L254	M toner (L270-L244) feed requested*	
L255	C toner (L271-L245) feed requested*	
L256	Y toner (L272-L246) feed requested*	
L257	BK toner (L273-L247) feed requested*	
L258	Unused	
L259	Unused	
L260	Measurement of M developing unit*	
L261	Measurement of C developing unit*	
L262	Measurement of Y developing unit*	
L263	Measurement of BK developing unit*	
L264	Concentration of M developer* (from last copying operation)	
L265	Concentration of C developer* (from last copying operation)	
L266	Concentration of Y developer* (from last copying operation)	
L267	Concentration of BK developer* (from last copying operation)	
L268	Unused	
L269	Unused	
L270	Concentration of toner in M developer (corrected)	Corrected value using data of L264
L271	Concentration of toner in C developer (corrected)	Corrected value using data of L265
L272	Concentration of toner in Y developer (corrected)	Corrected value using data of L266
L273	Concentration of toner in BK developer (corrected)	Corrected value using data of L267
L274	Dark area measured V_D3 potential	
L275	Light area measured V_L3 potential	
L276	White area potential	$V_G = -500V$
L277	Dark area potential	$V_G = -500V$

* Data from last copying operation.

Address	Display	Remarks
L300	For adjustment at factory	
L301	For adjustment at factory	
L302	For adjustment at factory	
L303	For adjustment at factory	
L304	For adjustment at factory	
L305	For adjustment at factory	
L306	For adjustment at factory	
L307	For adjustment at factory	
L308	For adjustment at factory	
L309	For adjustment at factory	
L310	For adjustment at factory	
L311	For adjustment at factory	
L312	For adjustment at factory	
L313	For adjustment at factory	
L314	For adjustment at factory	
L315	Unused	
L316	Fixing roller temperature (°C)	
L317	DC controller Q164 version number	
L318	Unused	
L319	Unused	
L320	Color(s) specified (externally) for printing	See Table 7-28
L321	Cassette selected*	0: Upper, 1: Lower
L322	Transfer drum rotations per color*	0: Normal, 1: Two (A4/LTR paper only)
L323	For adjustment of factory	
L324	Character or photograph/projector mode*	0: Character mode, 1: Photograph/projector mode
L325	Standard paper size/auto length recognition for manual feed	0: Irregular size, 1: Standard size
L326	For adjustment at factory	
L327	Unused	
L328	Unused	
L329	Unused	
L330	Meaning of E020 indication (M developer)	Refer to Table 7-29.
L331	Meaning of E020 indication (C developer)	Refer to Table 7-29.
L332	Meaning of E020 indication (Y developer)	Refer to Table 7-29.
L333	Meaning of E020 indication (BK developer)	Refer to Table 7-29.
L334	Meaning of E061 indication.	Refer to Table 7-30.
L335	Meaning of E021 indication.	Refer to Table 7-31.
L336	Meaning of E000 indication.	Refer to Table 7-32.

* Make a copy using the Image Scanner and check the indication.

Indication No.	1	2	3	4	5	6	7	8	F
Specified color	Y	M	Y, M (R)	C	Y, C (G)	M, C (B)	Y, M, C	BK	Y, M, C, BK

Table 7-28

Indication	Meaning
000	No error
001	Reading for address L260, L261, L262 or L263 is lower than required.
002	Reading for address L260, L261, L262, L263 is higher than required.
003	Reading for address L260 and L264, L261 and L265, L262 and L266, or L263 and L267 were identical four times or more in succession.
004	Reading for address L260 is less than half that for L244 (likewise for L261/L245, L262/L246, L263/L247).
005	Toner concentration does not reach the required value even after 20 or more toner-replenishing rotations of the transfer drum.
006	Reading for address L254 is less than that for L240 (likewise for L255/L241, L256/L242, L257/L243) for more than 30 copies in succession.

Table 7-29 Meaning of E020 indication

Indication	Meaning
000	Nor error
001	Difference between V_{D1} and V_{D2} is 50V or less.
002	V_D1 and V_D2, V_L1 and V_L2 are identical.
003	V_D2 and V_D3, V_L2 and V_L3 are identical.
006	Grid bias is at lower limit.
007	Grid bias is at upper limit.
008	Developing bias is at upper limit.

Table 7-30 Details of the E061 indication

Indication	Meaning
000	No error
001	Turret release sensor (Q12) does not sense that turret has been released.
002	PEND signal does not change to "1".
003	PEND signal does not change to "0".
004	Turret release sensor (Q12) does not detect that turret has been locked.
005	TURRET AT HOME POSITION signal is not generated within 20 seconds.
006	END signal does not change to "0".
008	Overcurrent is detected.

Table 7-31 Details of the E021 indication

Indication	Meaning
000	No error
004	Thermistor connector is unplugged.
005	Temperature of fixing roller is above 200°C.
006	Temperature of fixing roller does not reach 50°C within 2 minutes after power is switched on.

Table 7-32 Details of the E000 indication

C. ADJUSTMENT Mode (⧆3⧆)

1. Press ⧆□□□⧆ to select an address.
   └ Address

   The indication will change to
   U□□□
   └ Setting

   Press INV to check the address number.

2. To increase the setting,
   press ⧆ +/− +/− ⧆
   └ The number increments by one each time this key is pressed.

   To decrease the setting,
   press ⧆ INV +/− ⧆
   └ The number decrements by one each time this key is pressed.
   └ Hold the INV key down while pressing +/−.

3. Press C to exit the ADJUSTMENT mode.

Address	Purpose	Range of value displayed	Operation/Remarks
U100	For cancelling, all setting made in ADJUSTMENT mode, and returning to standard values.	−	Press ⧆ +/− +/− ⧆ to return to standard value.
U101	For selecting automatic or manual adjustment of target contrast potential.	−	"0" for automatic, "1" for manual.
U102	Unused		
U103	For selecting transfer corona current		See page 7-11P
U104	For selecting poor image transfer		
U105	For adjusting half-tone image density		Setting the switch to "0" produces average densities. Setting the switch to "1" increases densities.
U105 ~ U113	Unused		
U114	For adjusting contrast potential during M development	+20 to −20	
U115	For adjusting contrast potential during C development	+20 to −20	
U116	For adjusting contrast potential during Y development	+20 to −20	
U116	For adjusting contrast potential during BK development	+20 to −20	
U117 ~ U120	Unused		
U121	For manually adjusting grid bias **Note:** Press ⧆4⧆⧆206⧆1⧆ before selecting ⧆3⧆⧆121⧆	+20 to −15	Increasing the setting increases the grid bias voltage.
U122	For manually adjusting developing bias **Note:** Press ⧆4⧆⧆206⧆1⧆ before selecting ⧆3⧆⧆121⧆	+15 to −15	Increasing the setting increases the developing bias voltage DC component.
U150	For entering the value of L240	−	See page 7-10.
U151	For entering the value of L241	−	
U152	For entering the value of L242	−	
U153	For entering the value of L243	−	
U154	For entering the value of L244	−	
U155	For entering the value of L245	−	
U156	For entering the value of L246	−	
U157	For entering the value of L247	−	

D. SWITCH Mode ($\boxed{*}\boxed{4}\boxed{*}$)

1. Press the following keys to select the address.

   $\boxed{*}\underbrace{\boxed{}\boxed{}\boxed{}}_{\text{address}}\boxed{*}$

   The following will be displayed.
   Press $\boxed{\text{INV}}$ to confirm the address.

2. Press $\boxed{1}$ and $\boxed{*}$ to execute an operation. The following will be displayed.

   $\boxed{P}\boxed{}\boxed{}\underset{\text{or } \boxed{H}}{\boxed{1}}$

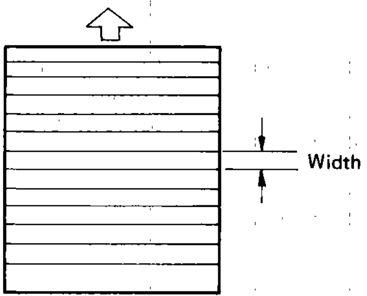
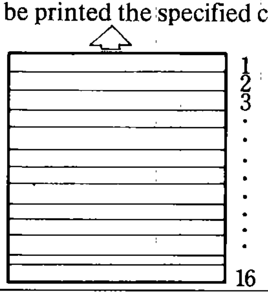
   However, when the final part of the display is $\boxed{H}$, the machine will automatically complete the operation.
   To stop the operation press $\boxed{0}\boxed{*}$.
   Press $\boxed{1}\boxed{*}$ to repeat an operation.
   Press $\boxed{0}\boxed{*}$ to stop execution.
3. Press $\boxed{C}$ to exit the SWITCH Mode.

Address	Purpose	Operation	Remarks
P100	For adjusting the target contrast potential manually.	Set the 7-segment display for the desired color to the number for the required contrast (1 through 5) using the button below the display. Press $\boxed{*}\boxed{4}\boxed{*}\boxed{1}\boxed{0}\boxed{0}\boxed{*}\boxed{1}\boxed{*}$ The drum surface potential will be adjusted automatically.	Operation stops automatically after surface potential has been adjusted.
P101	For adjusting target contrast potential automatically.	Press $\boxed{1}\boxed{*}$. The surface potential will be adjusted automatically to suit the data from the environmental sensors.	Operation stops automatically after furface potential has been ajusted.
P102	Unused		
P103	For adjustment at the factory.		
P104	For decreasing image density.	Use this adjustment if copy quality is poor when the machine is installed. Press $\boxed{1}\boxed{*}$ Five steps of image density can then be selected.	Several hours after this adjustment, the inputted data are cleared and the surface potential is again adjusted, using data from the environmental sensor.
P105	For increasing image density.		
P106	For registering the initial data of the environment sensor.	Press $\boxed{1}\boxed{*}$ to register the initial data.	
P107	For rewriting data when the ROM is replaced.	Press $\boxed{1}\boxed{*}$ to rewrite RAM data.	
P108 ~ P109	Unused		
P110	For adjusting BD mirror.	Press $\boxed{1}\boxed{*}$ to switch the laser ON. Press $\boxed{0}\boxed{*}$ to switch the laser OFF. **Note:** E100 is displayed if a BD error occurs while the laser is ON.	Insert the door switch tool in the door switch unit to move a side the laser beam blocking plate.
P111	For checking laser operation (mode 1).	Press $\boxed{1}\boxed{*}$ to switch the laser ON. Press $\boxed{0}\boxed{*}$ to switch the laser OFF.	
P112	For checking laser operation (mode 2).		
P113 ~ P116	For adjusting laser power VRs.	Press $\boxed{1}\boxed{*}$ to switch the laser ON. Press $\boxed{0}\boxed{*}$ to switch the laser OFF.	
P117 ~ P119	Unused		

Address	Purpose	Operation	Remarks
P120	Cleaning transfer drum.	Press 1 ✱ The transfer drum will be cleaned.	The machine stops automatically after cleaning.
P121	Cleaning primary corona wire.	Press 1 ✱. The primary corona wire will be cleaned.	
P122	Driving primary corona wire cleaner forward.	Press 1 ✱. The cleaner will move forward and stop at the back end of the primary corona unit.	Used for replacing the cleaner.
P123	Driving primary corona wire cleaner bachward.	Press 1 ✱. The cleaner will move backward and stop at the front end of the primary corona unit.	
P124	Magenta toner feedscrew clutch (CL5) ON.	Press 1 ✱. The main motor will run and the clutch go ON for 1s to operate the feedscrew.	Turret rotates to bring required developing unit to the position for feeding toner. After toner has been added, turret returns to its HOME position.
P125	Cyan toner feedscrew clutch (CL6) ON.		
P126	Yellow toner feedscrew clutch (CL7) ON.		
P127	Black toner feedscrew clutch (CL8) ON.		
P128	Unused		
P129	Unused		
P130	For stirring the developer.	Press 1 ✱. The main motor and turret motor will operate and stir the toner for approximately 3.5 minutes.	This time period is equal to making 16 full-color copies (A4/LTR).
P131	For increasing magenta developer concentration to standard.	Press 1 ✱. The selected developing unit is moved to the development position. The lamp of the toner concentration sensor goes ON and the toner concentrations measured. The result is shown ON the 7-segment displays. Press 0 ✱. The turret will returns to its HOME position. STANDBY will begin is activated	
P132	For increasing cyan developer concentration to standard.		
P133	For increasing yellow developer concentration to standard.		
P134	For increasing black developer concentration to standard.		
P135	Developer concentration measurement and registration.	Press 1 ✱. The main motor and rotator motor operate for approximately 3.5 minutes and measurement and registration are performed.	
P136	Magenta developer concentration measurement and registration.	Press 1 ✱. The main motor and turret motor operate and measurement and registration of the specified developer concentration is performed. More the turret by hand to position the developing unit to be empties to the required position.	
P137	Cyan developer concentration measurement and registration.		
P140	Yellow developer concentration measurement and registration.		
P141	Black developer concentration measurement and registration.		
P142	For removing developer in the developing unit.	Press 1 ✱. The developer will be removed from the developing unit. Press 0 ✱ after the developer has been removed.	

Address	Purpose	Operation	Remarks
P143	For checking operation of turret by setting the magenta developing unit to the development position.	Press $\boxed{1}\boxed{*}$. The turret rotates and moves the specified developing unit to the operating position.	
P144	For checking operation of turret by setting the cyan developing unit to the development position.		
P145	For checking operation of turret by setting the yellow developing unit to the development position.		
P146	For checking operation of turret by setting the black developing unit to the development position.		
P147	For checking operation of turret by setting the turret to its HOME position.		
P150	For setting all preconditioning exposure lamps ON.	Press $\boxed{1}\boxed{*}$. The preconditioning exposure lamps will go ON for 2 sec.	
P151	Unused		
P152	For toner applying mode	Press $\boxed{1}\boxed{*}$ to apply toner to the drum.	
P153	For operating main motor.	Press $\boxed{1}\boxed{*}$ to operate main motor. Press $\boxed{0}\boxed{*}$ to stop main motor.	
P154	For operating drum motor.	Press $\boxed{1}\boxed{*}$ to operate drum motor. Press $\boxed{0}\boxed{*}$ to stop drum motor.	
P155	For operating developing unit drive motor runs.	Press $\boxed{1}\boxed{*}$ to operate developing unit drive motor. Press $\boxed{0}\boxed{*}$ to stop developing unit drive motor.	
P156	For operating oil applying roller solenoid (SL6).	Press $\boxed{1}\boxed{*}$ to operate SL6. Press $\boxed{0}\boxed{*}$ to stop SL6.	
P157	For operating toner concentration sensor lamp (LA1) and filter change solenoid (SL21).	Press $\boxed{1}\boxed{*}$ to operate LA1 and SL12. Press $\boxed{0}\boxed{*}$ to stop LA1 and SL12.	
P158	Unused		
P159	Unused		
P160	For operating primary corona and grid bias system.	Press $\boxed{1}\boxed{*}$ to cause high-voltage output. Press $\boxed{0}\boxed{*}$ to stop high-voltage output.	Pre-conditioning exposure lamps and drum motor operate simultaneously.
P161	For operating developing bias DC component system.	Press $\boxed{1}\boxed{*}$ to cause DC component output. Press $\boxed{0}\boxed{*}$ to stop DC component output.	
P162	For operating developing bias AC component system.	Press $\boxed{1}\boxed{*}$ to cause AC component output. Press $\boxed{0}\boxed{*}$ to stop AC component output.	
P163	For operating static charge eliminating corona (internal) DC component.	Press $\boxed{1}\boxed{*}$ to cause DC component output. Press $\boxed{0}\boxed{*}$ to stop DC component output.	The drum motor operates at the same time.

Address	Purpose	Operation	Remarks
P164	For operating separation corona system.	Press [1][✱] to cause high-voltage output. Press [0][✱] to stop high-voltage output.	The drum motor operates at the same time.
P165	For operating static charge eliminating corona AC component system.	Press [1][✱] to cause AC component output. Press [0][✱] to stop AC component output.	The drum motor operates at the same time.
P166	For operating pre-fixing corona system.	Press [1][✱] to cause high-voltage output. Press [0][✱] to stop high-voltage output.	The drum motor operates at the same time.
P167	For operating transfer corona system.	Press [1][✱] to cause high-voltage output. Press [0][✱] to stop high-voltage output.	Primary corona, grid bias, pre-conditioning exposure lamps, and drum motor all operate simultaneously.
P168	Unused		
P169	Unused		
P170	For operating transfer corona (1st color).	Press [1][✱] to cause high-voltage output. Press [0][✱] to stop high-voltage output.	Primary corona, grid bias, pre-conditioning exposure lamps, and drum motor all operate simultaneously.
P171	For operating transfer corona (2nd color).		
P172	For operating transfer corona (3rd color).		
P173	For operating transfer corona (4th color).		
P174	For operating transfer corona (OHP film 1st color).		
P175	For operating transfer corona (OHP film 2nd color).		
P176	For operating transfer corona (OHP film 3rd color).		
P177	For operating transfer corona (OHP film 4th color).		
P178 ~ P199	Unused		
P200	For cancelling E000.	Press [1][✱] to cancel E000	See page 7-94.
P201	For adjustment at the factory.		
P202	For inhibiting paper feed (paper is not fed).	Press [1][✱] to inhibit the function. Press [0][✱] to re-enable the function. **Note:** P201 through P206 can be set in this way.	If the service mode is exited, the settings are cancelled.
P203	For inhibiting turret operation (turret does not rotate).		
P204	For inhibiting jam detection (Jam detection is not performed).		
P205	For inhibiting toner concentration sensing (fixed amount of toner is supplied for each copy).		

Address	Purpose	Operation	Remarks
P206	For inhibiting surface-adjustment potential (fixed output from all high-voltage transformers).	Press $\boxed{1}\boxed{*}$ to inhibit the function. Press $\boxed{0}\boxed{*}$ to re-enable the function. **Note:** P201 through P206 can be set in this way.	If the service mode is exited, the settings are cancelled.
P207	For adjustment at the factory		
P208	Unused		
P209	Unused		
P210	For measuring nip width (fixing rollers).	Put a filled A4/letter cassette in the upper cassette holder. Press $\boxed{1}\boxed{*}$, then press the TEST PRINT key. Paper will automatically be fed, printed on, and held for about 15 sec between the fixing rollers, then delivered.	
P211	0.25 mm wide horizontal stripe test print.	Press $\boxed{1}\boxed{*}$, then press the TEST PRINT key. The pattern will be printed automatically.  	Paper is drawn from the upper cassette.
P212	1 mm wide horizontal stripe test print.		
P213	4 mm wide horizontal stripe test print.		
P214	16 mm wide horizontal stripe test print.		
P215	64 mm wide horizontal stripe test print.		
P216	Magenta developer 16-gradation test print.	Press $\boxed{1}\boxed{*}$, then press the TEST PRINT key. The 16-gradation pattern will be printed the specified color.  	Paper is drawn from the upper cassette.
P217	Cyan developer 16-gradation test print.		
P220	Yellow developer 16-gradation test print.		
P221	Black developer 16-gradation test print.		
P222	For adjustment at the factory.		
P223	Halftone 1 test print.	Press $\boxed{1}\boxed{*}$, then press the TEST PRINT key. A test print of the specified density is made.	- All the copies are produced in magenta. - Paper is drawn from the upper cassette.
P224	Halftone 2 test print.		
P225	Halftone 3 test print.		
P227	Halftone 4 test print.		
P226	For adjustment at the factory.		
P230	64-color test print 1.	Press $\boxed{1}\boxed{*}$, then press the TEST PRINT key. A 64-color pattern test print is made.	- Paper is drawn from the upper cassette.
P231	64-color test print 2.		
P232	Unused		
P233	Unused		
P234	For removing magenta toner in the hopper.	Remove the developer unit. Move the turret by hand to position the developing unit be emptied to the required position. Press $\boxed{1}\boxed{*}$. The toner will be removed from the hopper. Press $\boxed{0}\boxed{*}$ after the toner has been removed.	
P235	For removing cyan toner in the hopper.		
P236	For removing yellow toner in the hopper.		
P237	For removing black toner in the hopper.		

E. COUNTER READING MODE ([*][6][*])

1. Select the address number
   press [*]□□□[*]
   └── Address number
   The display will change to
   [h]□□□
   └── Counter reading.
2. The counter indicates the total using two addresses.
   For example, when the indication is [3][2][1] for address [h][1][0][0] and □[1][2] for address [h][1][0][1], the count is 12321.
3. Press the [C] key to exit the COUNTER READING mode.

Address No.	Type of counter	Unit	Remarks
h100	M developing unit counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h101	M developing unit counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h102	C developing unit counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h103	C developing unit counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h104	Y developing unit counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h105	Y developing unit counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h106	BK developing unit counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h107	BK developing unit counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h110	M copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h111	M copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h112	C copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h113	C copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h114	Y copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h115	Y copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h116	BK copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h117	BK copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h120	R copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h121	R copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h122	G copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h123	G copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h124	B copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h125	B copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h126	3-color full-color copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h127	3-color full-color copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h130	4-color full-color copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h131	4-color full-color copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.
h132	Total copy counter (low digits)	× 1	Returns to 000000 after 999999 is reached.
h133	Total copy counter (high digits)	× 1000	Returns to 000000 after 999999 is reached.

VIII. SELF-DIAGNOSIS

A. Self-Diagnosis Indications

The COLOR LASER COPIER has a self-diagnosis feature based on sensors, the CPU PCB, and the microcomputer of the DC controller PCB. If the self-diagnosis system detects an abnormality, the appropriate error code is displayed on the touch-panel display of the control panel and on the display PCB.

The table below lists the error codes, causes, and timing of tests.

Error code	Major causes	Condition(s) identifying problem
E000	· Thermistor (TH1) open circuit or poor contact. · Broken fixing roller heater (H1, H2). · Defective AC driver PCB. · Defective DC controller PCB. · Defective triac.	· Fixing roller temperature has not reached 50°C within four minutes after power is switched ON. · Fixing roller temperature exceeded 200°C. · Thermistor connector is disconnected.
E005	· Cleaning belt of fixing unit nearly all used. · Defective remaining cleaning belt sensor (Q25). · Defective DC controller PCB.	· The thickness of the fixing unit cleaning belt on the take-up reel exceeds the allowable limit.
E010	· Defective drum motor. · Defective motor driver PCB. · Defective DC controller PCB.	· Clock pulses are not being generated within 0.2 second after the drum motor starts rotating and the first TRANSFER DRUM HOME POSITION SENSOR signal is outputted. · The specified number of clock pulses is not outputted for one rotation of the transfer drum.
E012	· Faulty drum motor. · Defective DC driver PCB. · Defective DC controller PCB.	· The speed of the main motor was not of the specified range for 2 seconds or more.
E020	· Defective toner concentration sensor PCB. · Defective developing unit optical fiber. · Defective lamp (LA1). · Defective display PCB.	· Reading for address L260, L261, L262 or L263 is lower than required. · Reading for address L260, L261, L262, L263 is higher than required. · Reading for addresses L260 and L264, L261 and L265, L262 and L266, or L263 and L267 were indentical four time or more in succession. · Reading for address L260 is less than half that for L244 (likewise for L261/L245, L262/L246, L263/L247). · Toner concentration does not reach the required value even after 20 or more toner-replenishing rotations of the transfer drum. · Reading for address L254 is less than that for L240 (likewise for L255/L241, L256/242, L257/L243) for move than 30 copies in succession.
E021	· Defective turret motor (M4). · Defective turret motor controller PCB. · Defective turret motor driver PCB. · Defective turret motor driver unit. · Defective DC controller PCB.	· Overcurrent detection circuit of the turret motor controller PCB detects an overcurrent. · The TURRET HOME POSITION SENSOR signal is not generated within 20 seconds after the turret returns to its home position. · The turret has not reached a specified new position within 3 seconds after the MOTOR DRIVE command is sent.

Error code	Major causes	Condition(s) identifying problem
E030	· Discontinuity in coil circuit of counter. · Defective DC controller PCB. · Defective DC driver PCB.	· Counter does not operate when it should.
E040	· Defective cassette paper lifter clutch. · Defective DC driver PCB. · Defective DC controller PCB.	· CASSETTE LIFTER POSITION SENSOR signal is not generated within ten seconds after the CASSETTE PAPER LIFTER CLUTCH DRIVE command was outputted.
E061	· Defective drum surface potential measuring unit. · Defective drum surface potential controller PCB. · Defective primary corona unit. · Defective HVT-DC2. · Defective DC controller PCB.	· While the drum potential is being adjusted, the dark area potential (V_D) is identical to the light area potential (V_L). · Grid bias limiter has come into operation. · Developing bias limiter has come into operation. · While the drum potential is being adjusted, the difference between V_D1 and V_D2 is 50V or less.
E070	· Defective drum motor. · Defective motor driver PCB. · Defective transfer drum home position sensor (Q16). · Defective DC controller PCB. · Defective transfer drum.	· The first TRANSFER DRUM HOME POSITION SENSOR signal is not outputted within 6 seconds after the drum motor starts rotating. · While the drum motor is rotating, the TRANSFER DRUM HOME POSITION SENSOR signal is outputted at intervals of 6 seconds or more.
E071	· Defective image leading edge sensor (Q15). · Defective DC controller PCB.	· While the drum motor is rotating, no IMAGE LEADING EDGE SENSOR signal is outputted in the period between two successive TRANSFER DRUM HOME POSITION SENSOR signals.
E100	· Incorrect position of the laser reflection (BD) mirror. · Defective laser unit. · Defective optical fiber. · Defective DC controller PCB.	· The period between successive BD signals differs from the specified value by 2 seconds or more.
E110	· Defective scanning mirror motor. · Defective scanning mirror motor driver PCB. · Defective DC controller PCB.	· Motor does not reach the specified speed within 60 seconds after the power is switched ON.
E120	· Defective laser unit. · Defective DC driver PCB. · Defective DC controller PCB.	· Laser unit has not reached the specified temperature within 60 seconds after the power is switched ON.
E205	· Defective scanner motor. · Defective scanner travel limit sensor (left or right). · Defective scanner motor controller PCB. · Defective CPU PCB. · Defective power supply to the scanner motor controller PCB.	· The scanner is not at its HOME position within 6 seconds after the power is switched ON and the CPU outputs the return to HOME POSITION command. · The scanner travel limit sensor (left or right) detects the scanner at the following times: 1. In STANDBY, 2. When signal ILEGC is received from the printer, 3. After a copying (image making) scanning operation. · There is a communication error between the CPU PCB and the scanner motor controller PCB.

Error code	Major causes	Condition (s) identifying problem
E302	· Defective scanning lamp · Defective standard white sheet · Defective CCD · Defective CCD pre-amplifier PCB · Defective CCD driver PCB · Defective analog processor PCB · Defective digital processor PCB · Defective wiring	· The density level is smaller (darker) than the standard value when measuring the standard white sheet after the COPY START key is pressed. (If SERVICE mode has been selected even once after scanner power is turned ON, E302 will not be detected from that time onward.)
E620	· Defective editor controller PCB. · Defective CPU PCB. · Defective power supply to the editor controller PCB.	· A communication error between the CPU PCB and the editor controller PCB has occurred.
E700	· Defective printer DC controller PCB. · Defective CPU PCB.	· A communication error between the CPU PCB and the DC controller PCB has occurred.

Reference:
When an error is detected by the self-diagnosis system, the machine can be reset by setting the power switch OFF briefly, then ON again, except when E000 is displayed to indicate a broken thermistor. (This prevents the user from damaging the fixing roller by restarting the machine and causing the roller to overheat).

E000 is reset using the printer SERVICE mode, as follows:

1) Set the SERVICE mode and enter [*][4][*][*][2][0][0][*] on the printer display PCB.
2) Press [1][*]. (This cancels E000).
3) Press the [C] key twice.
4) Set the power switch OFF then ON.

B. Printer Warning Indications

The CPU PCB and the DC controller microprocessor of the printer have error detection functions, especially to determine whether the sensors are effective. As soon as an abnormal condition is found, an error code is displayed by the LED indicators on the display PCB.

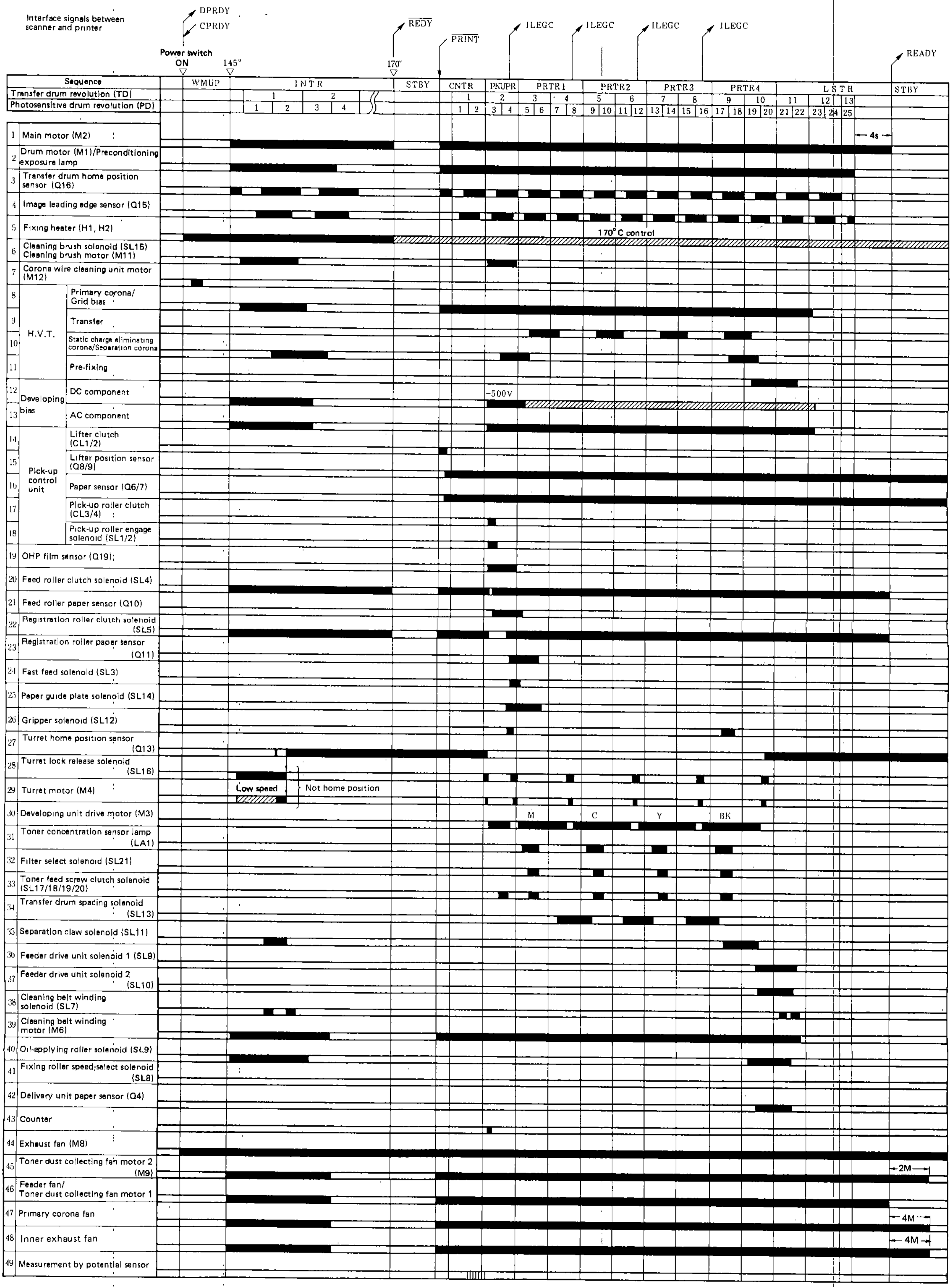
Remarks:
If the Document Scanner and Printer are connected, these error codes are transmitted to the Document Scanner and displayed on the control panel LCD display, but they are not displayed when if the printer and Document Scanner are disconnected and printer operation is checked, the LED indicators on the display PCB of the printer show any error codes.

The error codes are also displayed on the 7-segment displays on the display PCB.

Code	Reason for indication	Remarks
C40	No copy paper or no cassette	
C42	Waste toner above specified level	
C44	Door is open	
C47	Warm-up	
C48	No silicone oil fixing assembly	
C49	No control key	
C50	No magenta toner	
C51	No cyan toner	
C52	No yellow toner	
C53	No black toner	
C96	Miss print	
J30	Paper jam in upper cassette	
J31	Paper jam in lower cassette	
J32	Registration roller paper jam	
J33	Transfer drum paper jam	
J34	Separation unit paper jam	
J35	Delivery unit delay jam	
J36	Delivery unit stationary jam	

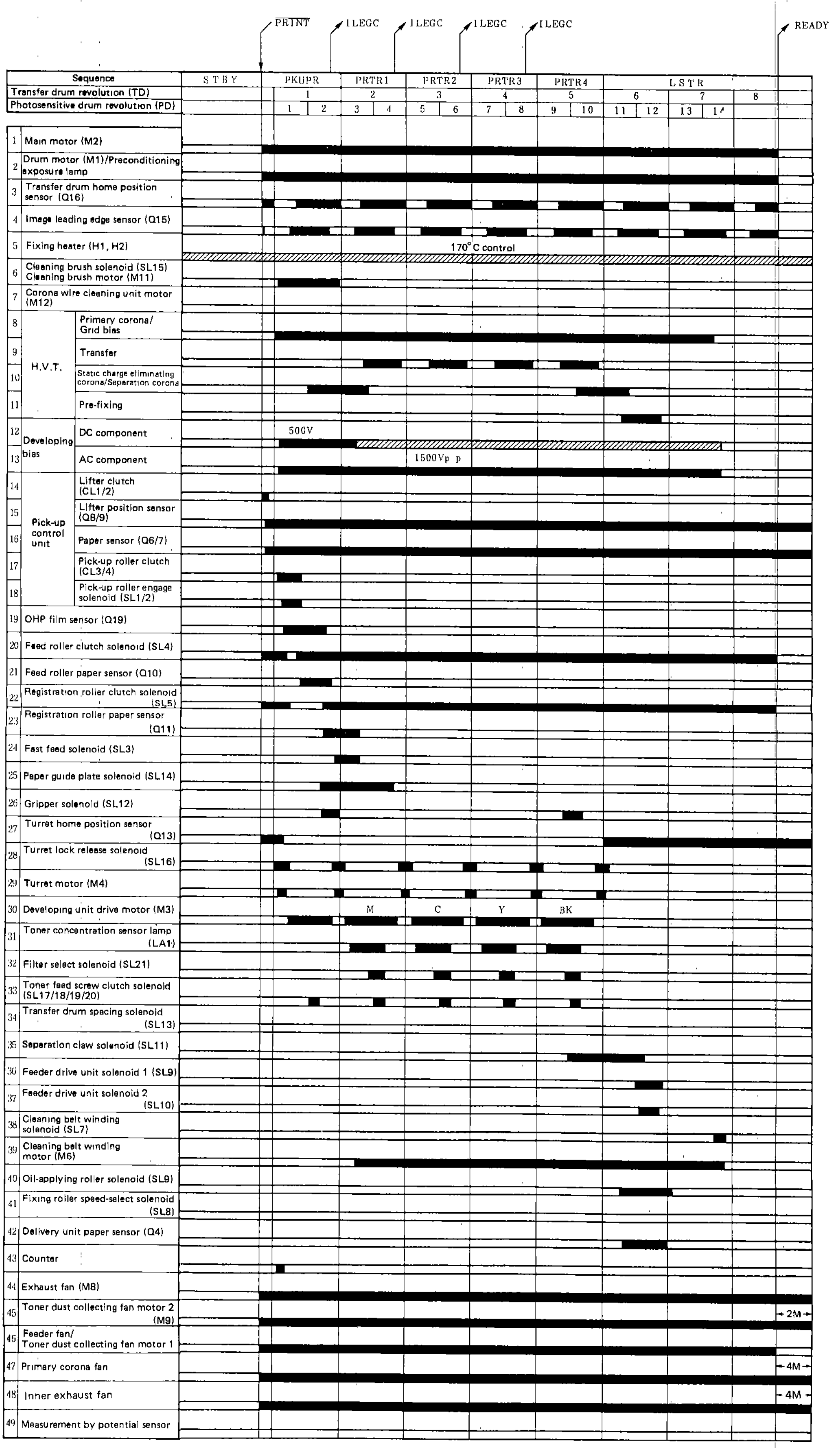
A. GENERAL TIMING CHART

GENERAL TIMING CHART (1/3)



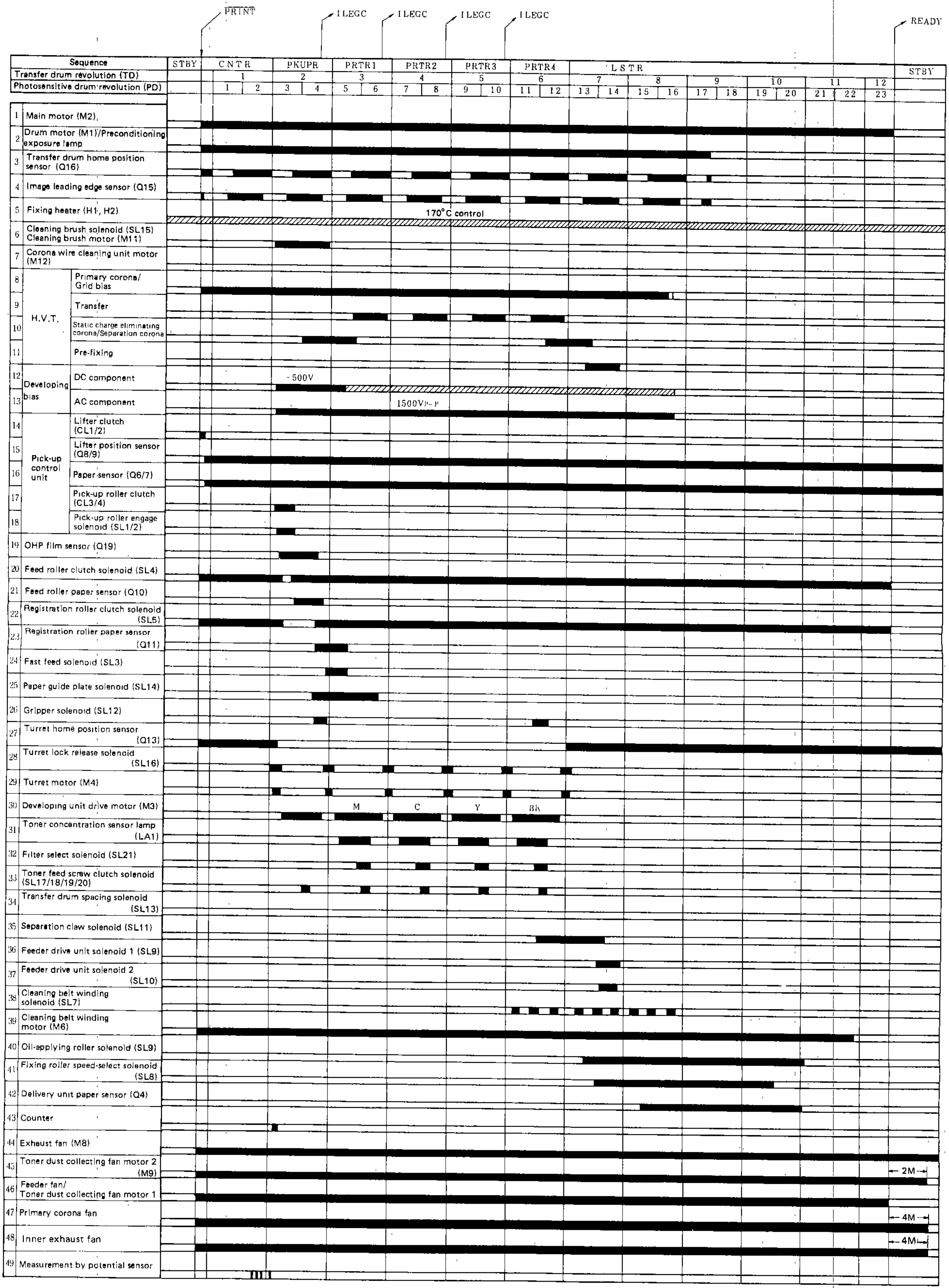
A3/Ledger/Full color copie

GENERAL TIMING CHART (2/3)



A4/Letter/Full color copie

GENERAL TIMING CHART (3/3)



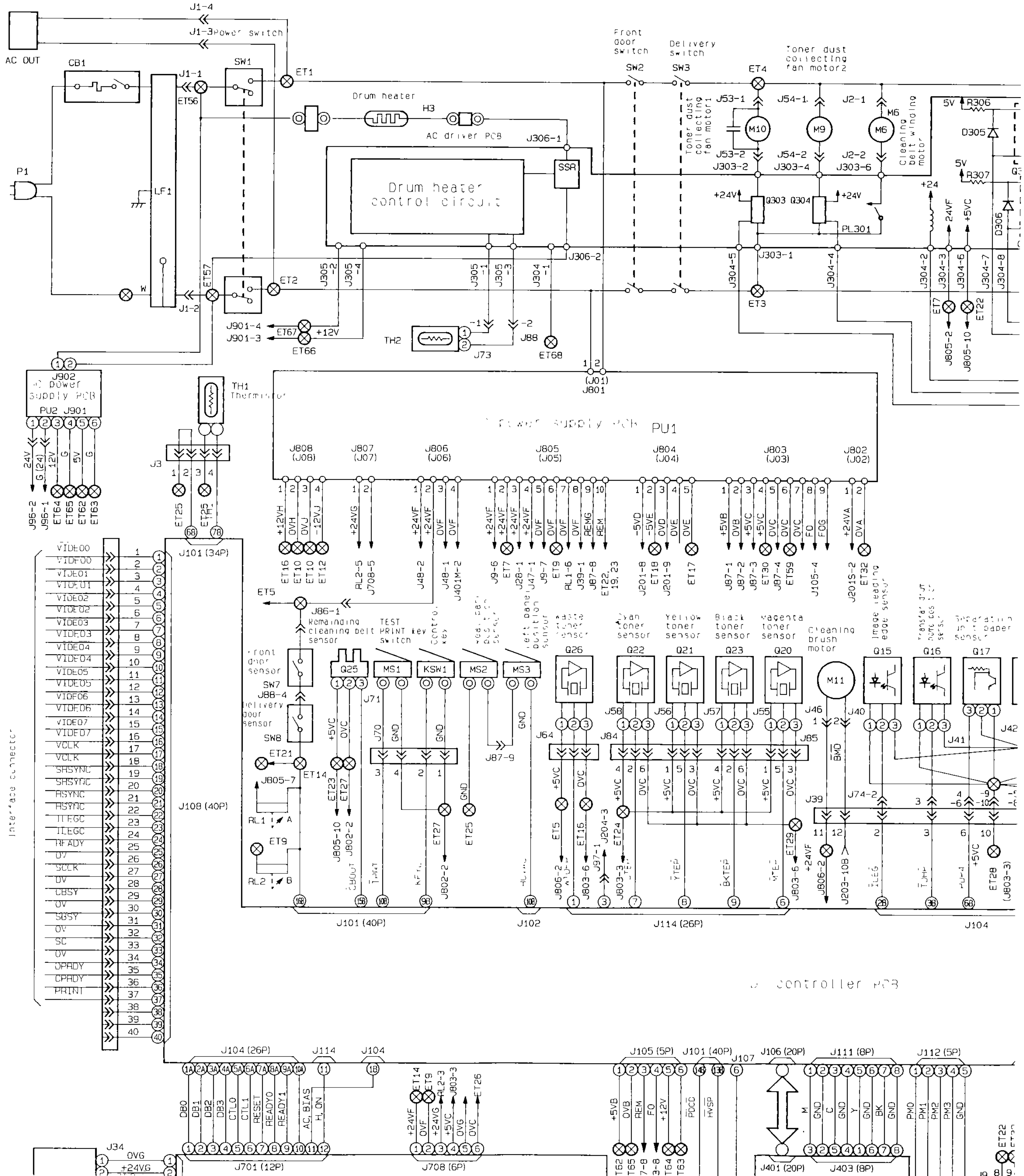
A4 OHP film/Full color copier

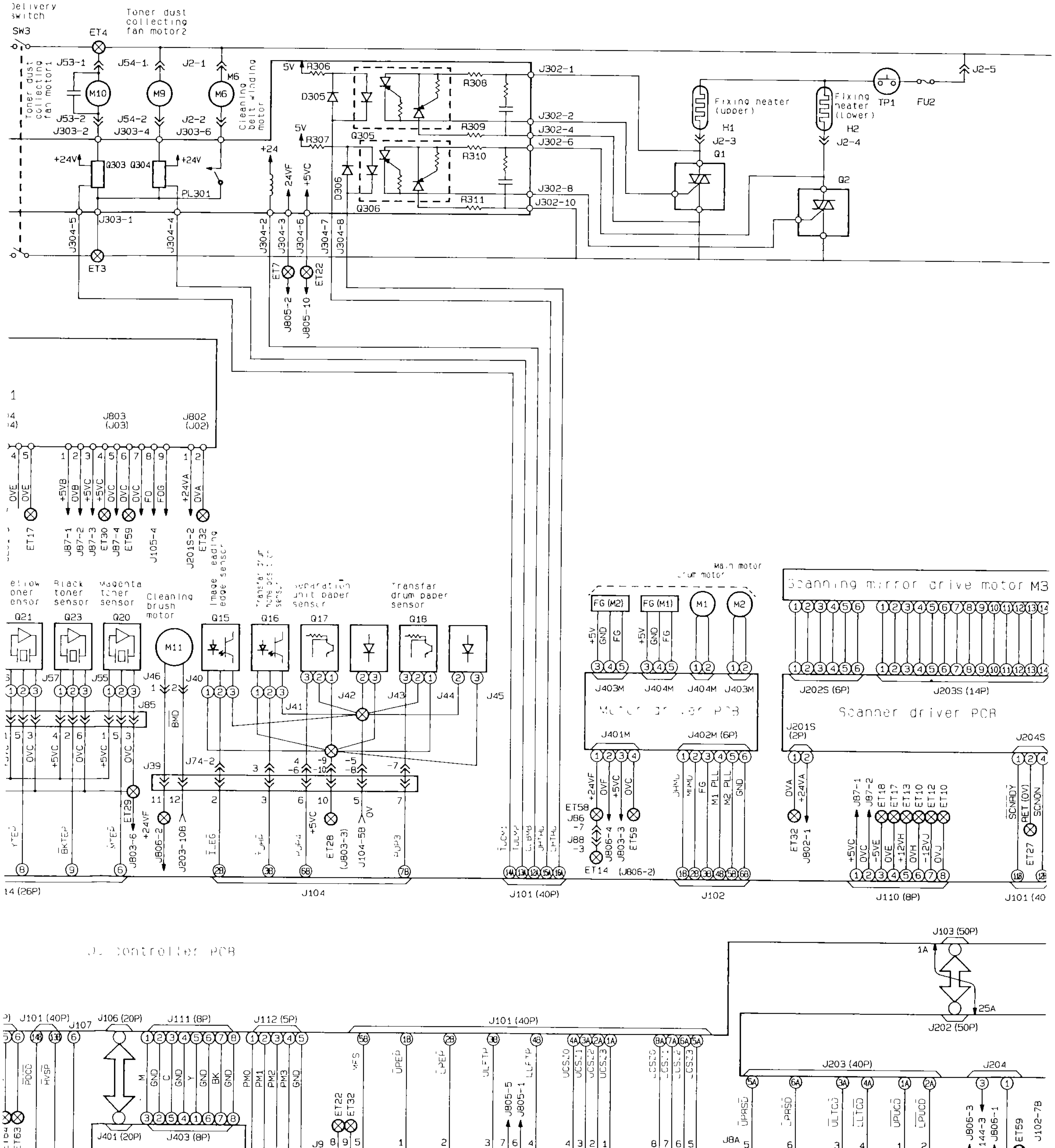
SIGNALS/COMMANDS

BD	BEAM DETECT signal
BKTEP	BLACK TONER OUT signal
BKTSCD	BLACK TONER FEED SCREW CLUTCH DRIVE command
BMD	CLANING BRUSH MOTER DRIVE command
BSD	CLANING BRUSH SOLENOID DRIVE command
CBOUT	CLEANING BELT OUT signal
CBSY	COMMAND BUSY signal
CLBMD	CLEANING BELT WINDING MOTER DRIVE command
CLBSD	CLEANING BELT WINDING SOLENOID DRIVE command
CLMD	CORONA WIRE CLEANING UNIT MOTER DRIVE command
CLMF	WIRE CLEANER FORWARD signal
CNT2D	COUNTER 2 DRIVE command
CNT3D	COUNTER 3 DRIVE command
CNT4D	COUNTER 4 DRIVE command
CTEP	CYAN TONER OUT signal
CTSCD	CYAN TONER FEED SCREW CLUTCH DRIVE command
DMD	DEVELOPING UNIT DRIVE MOTOR DRIVE command
DRMD	DRUM MOTOR DRIVE command
EFMD	EXHAUST FAN MOTOR DRIVE command
FFMD	FEEDER SECTION FAN MOTOR DRIVE command
FRSD	FEED ROLLER CLUTCH SOLENOID DRIVE command
FSD	FELTER CHANGE SOLENOID DRIVE command
FSD1	FEEDER DRIVE UNIT SOLENOID 1 DRIVE command
FSD2	FEEDER DRIVE UNIT SOLENOID 2 DRIVE command
GRSD	GRIPER SOLENOID DRIVE command
HSYNC	HORIZONTAL SYNCHRONOUS signal
HVBAC	AC DEVELOPING BIAS DRIVE command
[HVBDC]	DC DEVELOPING BIAS CONTROL command
[HVGB]	GRID BIAS CONTROL command
HVPF	PRE-FIXING CORONA DRIVE command
HVPR	PRIMARY CORONA DRIVE command
HVSP	SEPARATION CORONA DRIVE command
HVTR	TRANSFER CORONA DRIVE command
[HVTRC]	TRANSFER CORONA CURRENT CONTROL command
ILEG	IMAGE LEADING EDGE signal
ILEGC	IMAGE LEADING EDGE POSITION signal
KEYL	KEY LOCK signal
LCSZ0	LOWER CASSETTE SIZE 0 signal
LCSZ1	LOWER CASSETTE SIZE 1 signal
LCSZ2	LOWER CASSETTE SIZE 2 signal
LCSZ3	LOWER CASSETTE SIZE 3 signal
LD	LESER DRIVE command
LHTRD	LOWER HEATER DRIVE command
LLFTP	LOWER CASSETTE PAPER LEFTER POSITION SENSOR signal
LLTCD	LOWER CASSETTE PAPER LEFTER CLUTCH DRIVE command
LPEP	LOWER CASSETTE PAPER OUT signal
LPRSD	LOWER PICK-UP ROLLER ENGAGE SOLENOID DRIVE command
LPUCD	LOWER CASSETTE PICK-UP ROLLER CLUTCH DRIVE command
LSFSD	FIXING ROLLER SPEED SELECT command
MFS	MANUAL FEED SELECT signal
MNMD	MAIN MOTOR DRIVE command
MOL	(TURRET) MOTOR OVER LOAD signal
MTEP	MAGENTA TONER OUT signal
MTSCD	MAGENTA TONER FEED SCREW CLUTCH DRIVE command
OEP	OIL OUT signal
OHPDP	OHP FILM DETECTION signal
OSSD	OIL APPLYING ROLLER SOLENOID DRIVE command
PCFD	PRIMARY CORONA FAN MOTOR DRIVE command
PDCD	STATIC CHARGE ELIMINATING CORONA DRIVE command
PDDC	DC STATIC CHARGE ELIMINATING CORONA DRIVE command
PDP1	PAPER DETECTION signal 1
PDP2	PAPER DETECTION signal 2
PDP3	PAPER DETECTION signal 3
PDP4	PAPER DETECTION signal 4
PDP5	PAPER DETECTION signal 5
PEXP	PRECONDITIONING EXPOSURE LAMP DRIVE command
PGSD	PAPER GUIDE PLATE SOLENOID DRIVE command
PPRDY	PRINTER POWER READY signal
PRINT	PRINTER PRINT START command
READY	PRINTER READY signal
QFSD	FAST FEED SOLENOID DRIVE command
RCVRC	REAR/LEFT PANEL POSITION signal
RGSD	REGISTRATION ROLLER SOLENOID DRIVE command
RHP	TURRET HOME POSITION signal
RLR	TURRET LOCK LEVER RELEASE signal
RLRSD	TURRET LOCK LEVER RELEASE SOLENOID DRIVE command
RMD	TURRET MOTOR DRIVE command
RMRAC1	TURRET MOTOR ROTATION ANGLE CONTROL command 1
RMRAC2	TURRET MOTOR ROTATION ANGLE CONTROL command 2
RMRAC3	TURRET MOTOR ROTATION ANGLE CONTROL command 3
RMS	TURRET MOTOR STOP COMMAND
SBSY	STATUS BUSY signal
SC	STATUS/COMMAND signal
SCLK	SIRIAL CLOCK PLUSE signal
SCNON	SCANNING MIRROR DRIVE command
SCNRDY	SCANNER READY signal
SHSYNC	SCANNER HORIZONTAL SYNCHRONOUS signal
SPSD	SEPARATION CLAW SOLENOID DRIVE command
TCNTD	TOTAL COUNTER DRIVE command
TDCM1	TONER/DUST COLLECTTING MOTOR 1 DRIVE command
TDCM2	TONER/DUST COLLECTTING MOTOR 2 DRIVE command
TDHP	TRANSFER DRUM HOME POSITION signal
TH1	THERMISTOR TH 1 signal
TH2	THERMISTOR TH 2 signal
TH3	THERMISTOR TH 3 signal
TOSLD	TONER CONCENTRATION SENSOR LAMP DRIVE command
TPRT	TEST PRINT command
TSSD	TRANSFER DRUM SPACING SOLENOID DRIVE command
UCSZ0	UPPER CASSETTE SIZE 0 signal
UCSZ1	UPPER CASSETTE SIZE 1 signal
UCSZ2	UPPER CASSETTE SIZE 2 signal
UCSZ3	UPPER CASSETTE SIZE 3 signal
UHTRD	UPPER HEATER DRIVE command
ULFTP	UPPER CASSETTE PAPER LEFTER POSITION SENSOR signal
ULTCD	UPPER CASSETTE PAPER LEFTER CLUTCH DRIVE command
UPEP	UPPER CASSETTE PAPER OUT signal
UPRSD	UPPER PICK-UP ROLLER ENGAGE SOLENOID DRIVE command
UPUCD	UPPER CASSETTE PICK-UP ROLLER CLUTCH DRIVE command
VCLK	VIDEO CLOCK PULSE signal
VD07-0	VIDEO signal
WTOFP	EXCESS WASTE TONER signal
YTEP	YELLOW TONER OUT signal
YTSCD	YELLOW TONER FEED SCREW DRIVE command

LIST OF ABBREVIATIONS

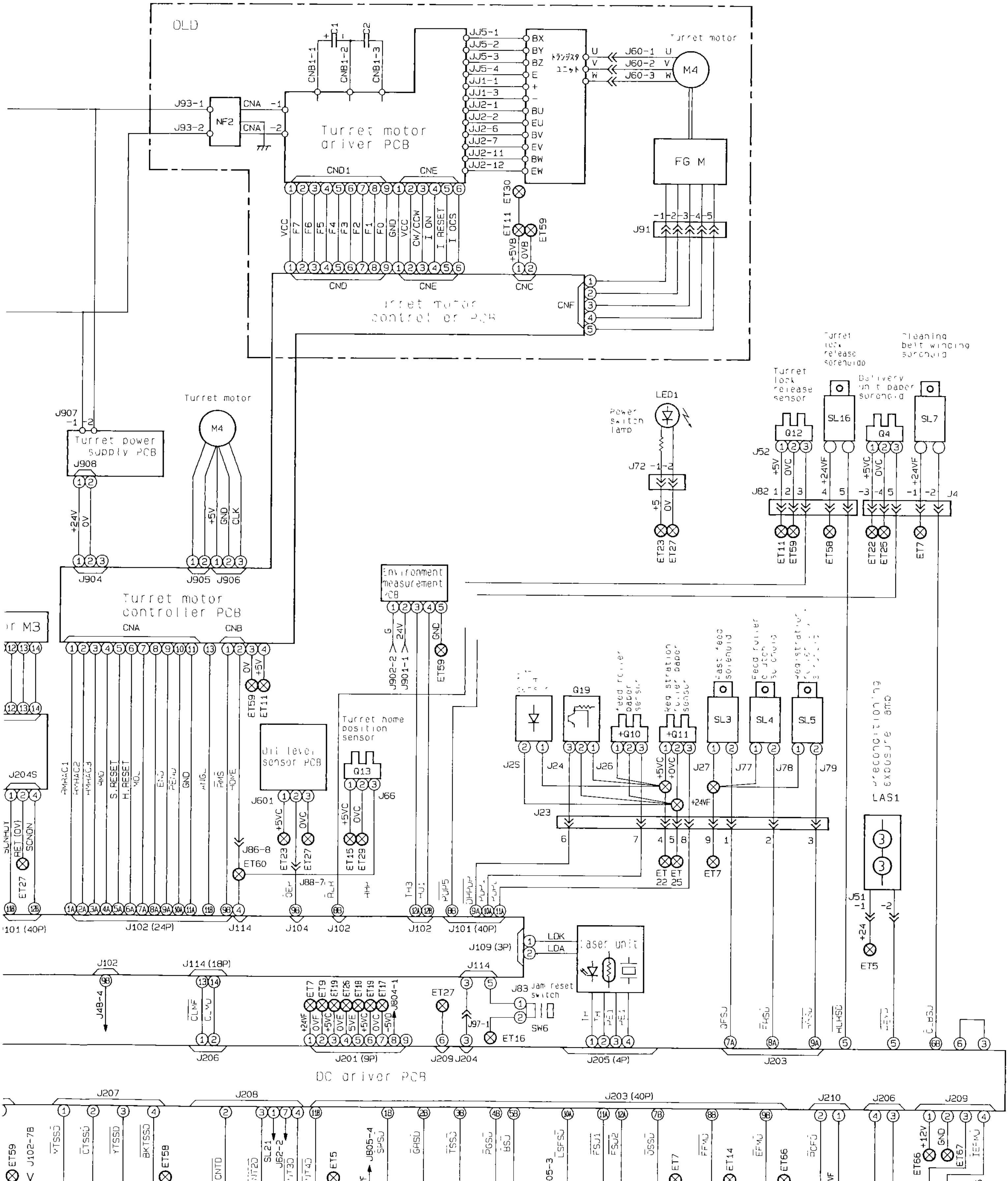
CNTR	ADJUSTMENT (CONTROL) ROTATION
INTR	INITIAL ROTATION
LSTR	LAST ROTATION
PKUPR	PICK-UP ROTATION
PRTR1	PRINT POTATAION 1
PRTR2	PRINT POTATAION 2
PRTR3	PRINT POTATAION 3
PRTR4	PRINT POTATAION 4
STBY	STAND BY
WMUP	WARM UP ROTATION


AC OUT
J1-4
J1-3
Power switch
CB1
SW1
J1-1
ET56
ET1
P1
LF1
W
J1-2
ET57
ET2
Drum heater
H3
AC driver PCB
J306-1
Drum heater control circuit
SSR
J306-2
J305-2
J305-4
J305-1
J305-3
J304-1
J901-4
J901-3
ET67
ET66
+12V
TH2
J73
J88
ET68
Front door switch
Delivery switch
SW2
SW3
Toner dust collecting fan motor2
Toner dust collecting fan motor1
Cleaning belt winding motor
ET4
J53-1
J53-2
J54-1
J54-2
J2-1
J2-2
M10
M9
M6
J303-2
J303-4
J303-6
+24V
Q303
Q304
PL301
J303-1
J304-5
J304-4
ET3
5V
R306
D305
R307
+24
24VF
+5VC
D306
J304-2
J304-3
J304-6
J304-7
J304-8
ET7
ET22
J805-2
J805-10
J902
AC power supply PCB
PU2
J901
24V
12V
G (24)
G
5V
J96-2
J96-1
ET64
ET65
ET62
ET63
TH1
Thermistor
J3
ET25
TH1
(J01)
J801
Power supply PCB
PU1
J808 (J08)
J807 (J07)
J806 (J06)
J805 (J05)
J804 (J04)
J803 (J03)
J802 (J02)
+12VH
0VH
0VJ
-12VJ
ET16
ET10
ET10
ET12
+24VG
RL2-5
J708-5
+24VF
0VF
J48-2
J48-1
J401M-2
ET5
J86-1
REMG
REM
J9-6
ET7
J28-1
J47-1
J9-7
ET9
RL1-6
J39-1
J87-8
ET22, 19, 23
-5VD
-5VE
0VD
0VE
J201-8
ET18
J201-9
ET17
+5VB
0VB
+5VC
0VC
FO
FOG
J87-1
J87-2
J87-3
ET30
J87-4
ET59
J105-4
+24VA
0VA
J201S-2
ET32
Remaining cleaning belt sensor
TEST PRINT key switch
Control key
Front door sensor
Delivery door sensor
Left panel position sensor
Waste toner sensor
Cyan toner sensor
Yellow toner sensor
Black toner sensor
Magenta toner sensor
Cleaning brush motor
Image leading edge sensor
Transfer drum home position sensor
Separation unit paper sensor
Q25
MS1
KSW1
MS2
MS3
Q26
Q22
Q21
Q23
Q20
M11
Q15
Q16
Q17
SW7
J88-4
SW8
J71
J70
GND
ET21
ET14
J805-7
RL1 A
RL2 B
ET9
ET23
ET27
J805-10
J802-2
ET27
ET25
J87-9
J64
J84
J58
J56
J57
J55
J85
J46
J40
J41
J42
J39
J74-2
BMD
ET5
ET16
J806-2
J803-6
J97-1
J204-3
ET24
J803-3
YTEP
BKTEP
ET29
J806-2
J203-10B
ET28
(J803-3)
J101 (40P)
J102
J114 (26P)
J104
J101 (34P)
J108 (40P)
Interface connector
VIDEO0
VIDEO1
VIDEO2
VIDEO3
VIDEO4
VIDEO5
VIDEO6
VIDEO7
VCLK
SHSYNC
HSYNC
ILEGC
READY
D7
SCLK
0V
CBSY
SBSY
SC
OPRDY
CPRDY
PRINT
DC controller PCB
J104 (26P)
J114
J104
DB0
DB1
DB2
DB3
CTL0
CTL1
RESET
READY0
READY1
AC BIAS
H ON
J701 (12P)
J34
0VG
+24VG
ET14
ET9
RL2-3
J803-3
ET26
+24VF
0VF
+24VG
+5VC
0VG
0VC
J708 (6P)
J105 (5P)
J101 (40P)
J107
J106 (20P)
J111 (8P)
J112 (5P)
+5VB
0VB
REM
FO
+12V
PDCC
HVSP
M
GND
C
Y
BK
PM0
PM1
PM2
PM3
J401 (20P)
J403 (8P)
ET22

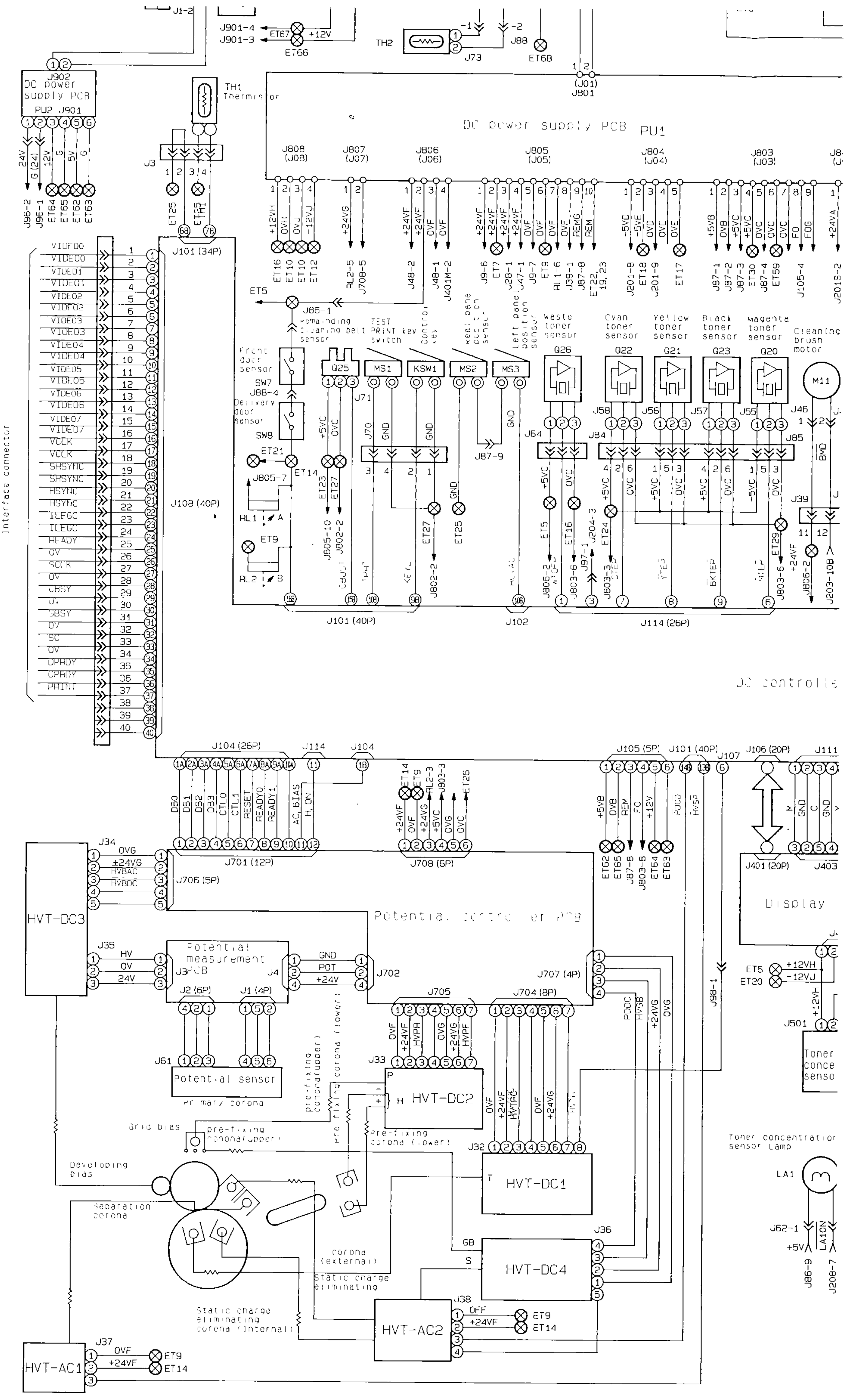


Delivery switch
SW3
Toner dust collecting fan motor2
ET4
Toner dust collecting fan motor1
J53-1
M10
J53-2
J303-2
J54-1
M9
J54-2
J303-4
J2-1
M6
J2-2
J303-6
Cleaning belt winding motor
+24V
Q303
Q304
+24V
PL301
J303-1
J304-5
ET3
J304-4
5V
R306
D305
R308
J302-1
J302-2
R309
J302-4
Q305
5V
R307
J302-6
R310
+24
24VF
+5VC
D306
J302-8
R311
J302-10
Q306
J304-2
J304-3
J304-6
J304-7
J304-8
ET7
ET22
J805-2
J805-10
Fixing heater (upper)
H1
J2-3
Q1
Fixing heater (Lower)
H2
J2-4
Q2
TP1
FU2
J2-5
J803 (J03)
J802 (J02)
OVE
ET17
+5VB
OVB
+5VC
OVC
FO
FOG
J87-1
J87-2
J87-3
ET30
J87-4
ET59
J105-4
+24VA
OVA
J201S-2
ET32
Yellow toner sensor
Black toner sensor
Magenta toner sensor
Cleaning brush motor
Image leading edge sensor
Transfer drum home position sensor
Separation unit paper sensor
Transfer drum paper sensor
Q21
Q23
Q20
M11
Q15
Q16
Q17
Q18
J57
J55
J46
J40
J85
J41
J42
J43
J44
J45
BMD
J39
J74-2
ET29
J803-6
+24VF
J806-2
J203-10B
ILEG
ET28
(J803-3)
J104-5B
OV
14 (26P)
J104
J101 (40P)
Main motor
Drum motor
FG (M2)
FG (M1)
M1
M2
J403M
J404M
J404M
J403M
Motor driver PCB
J401M
J402M (6P)
ET58
J86
J88
ET14
J806-4
J803-3
ET59
(J806-2)
M1 PLL
M2 PLL
GND
J102
Scanning mirror drive motor M3
J202S (6P)
J203S (14P)
Scanner driver PCB
J201S (2P)
J204S
ET32
J802-1
J87-1
J87-2
ET18
ET17
ET13
ET10
ET12
ET10
+5VC
OVC
-5VE
OVE
+12VH
OVH
-12VJ
OVJ
J110 (8P)
SCNRDY
RET (OV)
SCNON
ET27
J101 (40
DC controller PCB
J103 (50P)
1A
25A
J202 (50P)
J101 (40P)
J107
J106 (20P)
J111 (8P)
J112 (5P)
J101 (40P)
PDCC
HVSP
GND
C
Y
BK
PM0
PM1
PM2
PM3
MFS
UPEP
LPEP
ULFTP
LLFTP
UCS20
UCS21
UCS22
UCS23
LCS20
LCS21
LCS22
LCS23
J805-5
J805-1
ET22
ET32
ET63
J401 (20P)
J403 (8P)
J9
J203 (40P)
J204
UPRSD
LPRSD
ULTCD
LLTCD
UPUCD
LPUCD
J8A
J806-3
J806-1
ET59
J102-7B

C. PRINTER GENERAL CIRCUIT DIAGRAM



OLD
Turret motor driver PCB
Turret motor
M4
FG M
J91
トランジスタユニット
U
V
W
J60-1
J60-2
J60-3
BX
BY
BZ
E
BU
EU
BV
EV
BW
EW
JJ5-1
JJ5-2
JJ5-3
JJ5-4
JJ1-1
JJ1-3
JJ2-1
JJ2-2
JJ2-6
JJ2-7
JJ2-11
JJ2-12
C1
C2
CNB1-1
CNB1-2
CNB1-3
J93-1
J93-2
NF2
CNA -1
CNA -2
CND1
CNE
VCC
F7
F6
F5
F4
F3
F2
F1
F0
GND
CW/CCW
I ON
I RESET
I OCS
ET30
ET11
ET59
+5VB
0VB
CND
CNC
CNF
Turret motor controller PCB
J907
Turret power supply PCB
J908
+24V
0V
J904
J905
J906
+5V
CLK
CNA
CNB
M3
RMHAC1
RMHAC2
RMHAC3
RMD
S.RESET
H.RESET
MDL
PEND
RIGL
RMS
HOME
ET60
J86-8
J204S
SCNON
RET (0V)
ET27
J101 (40P)
J102 (24P)
J114
J104
J102
Environment measurement PCB
G
24V
J902-2
J901-1
Oil level sensor PCB
J601
+5VC
0VC
ET23
Turret home position sensor
Q13
J66
ET15
ET29
J88-7
TH3
TH1
Power switch lamp
LED1
J72
ET23
Turret lock release sensor
Q12
Turret lock release solenoid
SL16
Delivery unit paper solenoid
Q4
Cleaning belt winding solenoid
SL7
J52
J82
J4
+24VF
ET58
ET22
ET25
ET7
Q19
Feed roller paper sensor
Q10
Registration roller paper sensor
Q11
Fast feed solenoid
SL3
Feed roller clutch solenoid
SL4
Registration solenoid
SL5
J25
J24
J26
J27
J77
J78
J79
J23
ET22
ET25
Preconditioning exposure lamp
LAS1
J51
+24
ET5
J109 (3P)
LDK
LDA
Laser unit
J83
Jam reset switch
SW6
ET16
J97-1
ET27
J48-4
J114 (18P)
CLMF
CLMU
J206
J201 (9P)
J209
J204
J205 (4P)
J203
DC driver PCB
J207
J208
J203 (40P)
J210
J206
J209
ET59
J102-7B
YTSSD
CTSSD
BKTSSD
ET58
CNTD
SL21
J62-2
ET5
J805-4
GHSD
TSSD
PGSD
BSD
LSFSD
FSJ1
FSJ2
JSSD
FFMD
ET7
ET14
EFMD
ET66
PCFD
+12V
GND
ET67
IEMD


DC power supply PCB
PU2 J901
J902
TH1 Thermistor
TH2
J73
J88
ET68
ET67
ET66
J901-4
J901-3
+12V
DC power supply PCB PU1
J801
J808 (J08)
J807 (J07)
J806 (J06)
J805 (J05)
J804 (J04)
J803 (J03)
J3
Interface connector
VIDEO0
VIDEO1
VIDEO2
VIDEO3
VIDEO4
VIDEO5
VIDEO6
VIDEO7
VCLK
SHSYNC
HSYNC
ILEGC
READY
0V
SCLK
CBSY
SBSY
SC
CPRDY
PRINT
J101 (34P)
J108 (40P)
J101 (40P)
J102
J114 (26P)
Remaining cleaning belt sensor
TEST PRINT key switch
Control key
Left panel position sensor
Waste toner sensor
Cyan toner sensor
Yellow toner sensor
Black toner sensor
Magenta toner sensor
Cleaning brush motor
Front door sensor
Delivery door sensor
SW7
SW8
Q25
MS1
KSW1
MS2
MS3
Q26
Q22
Q21
Q23
Q20
M11
RL1
RL2
DC controller
J104 (26P)
J114
J105 (5P)
J106 (20P)
J111
J107
J401 (20P)
J403
Display
J701 (12P)
J708 (6P)
J706 (5P)
Potential controller PCB
J702
J707 (4P)
J705
J704 (8P)
HVT-DC3
Potential measurement PCB
J2 (6P)
J1 (4P)
J61
Potential sensor
Primary corona
Grid bias
Developing bias
Separation corona
pre-fixing corona (upper)
pre-fixing corona (lower)
HVT-DC2
HVT-DC1
HVT-DC4
HVT-AC2
HVT-AC1
Corona (external)
Static charge eliminating
Static charge eliminating corona (internal)
J32
J33
J34
J35
J36
J37
J38
Toner concentration sensor
Toner concentration sensor Lamp
LA1
J501
J62-1
J86-9
J208-7

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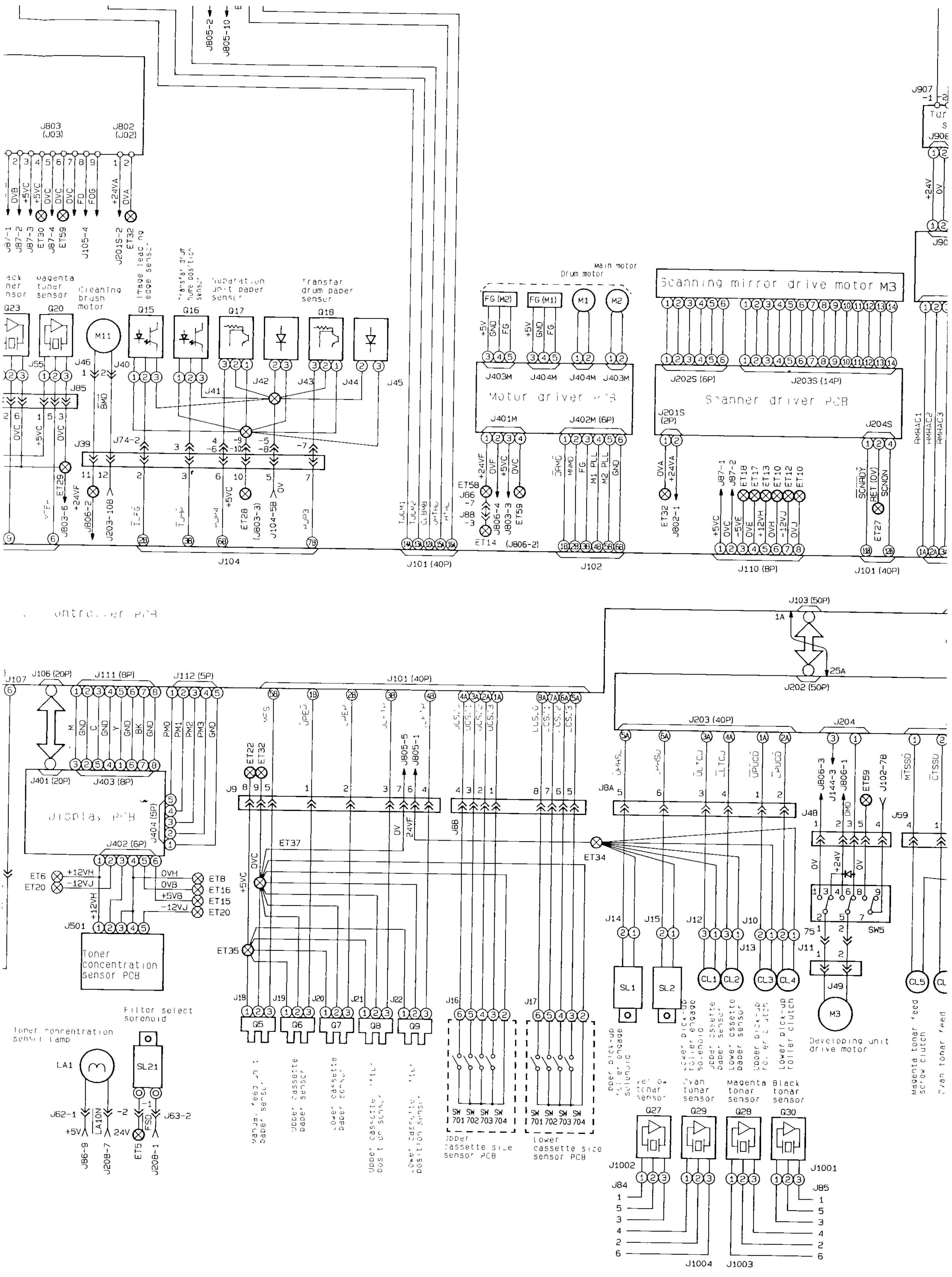
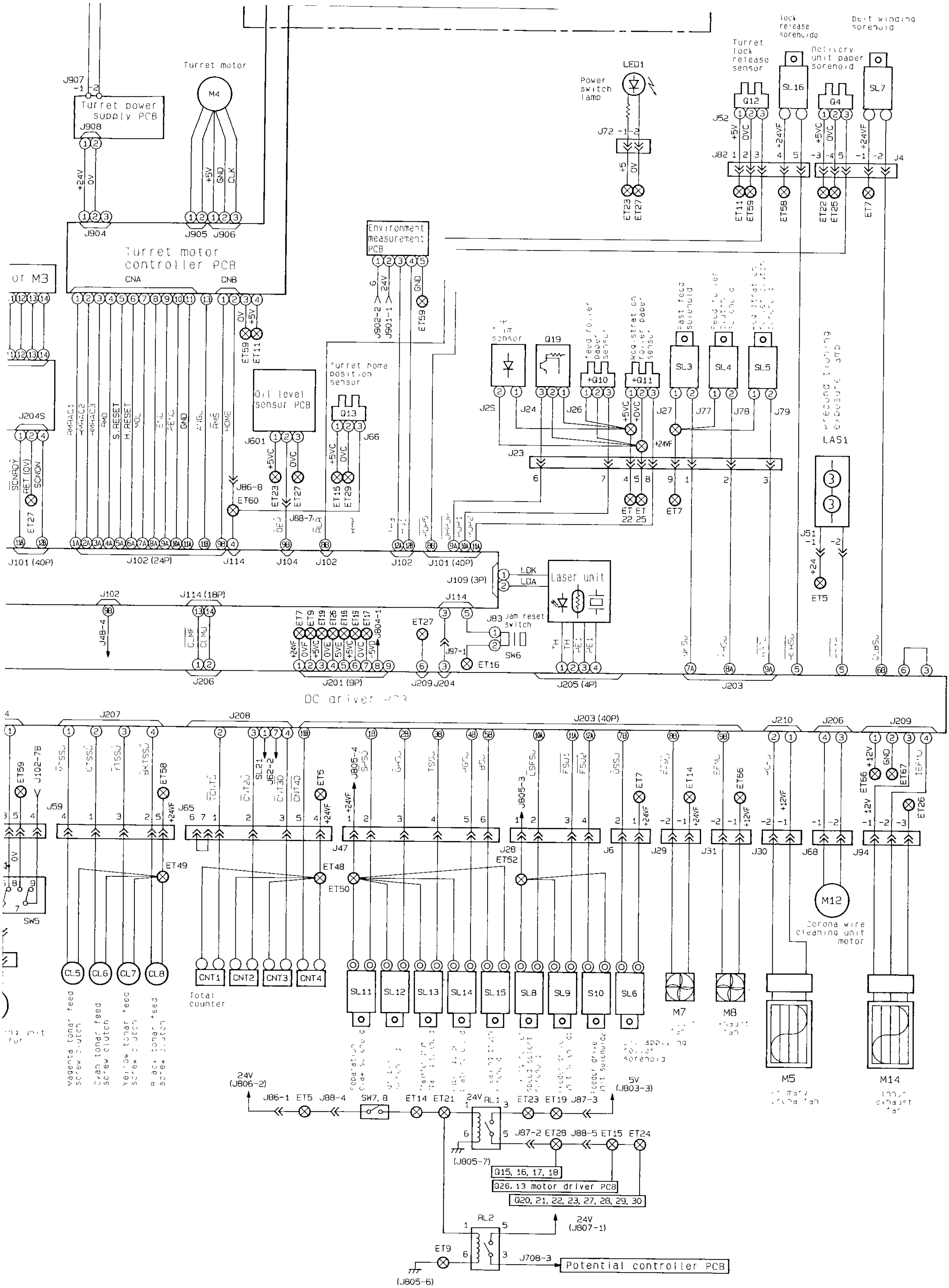
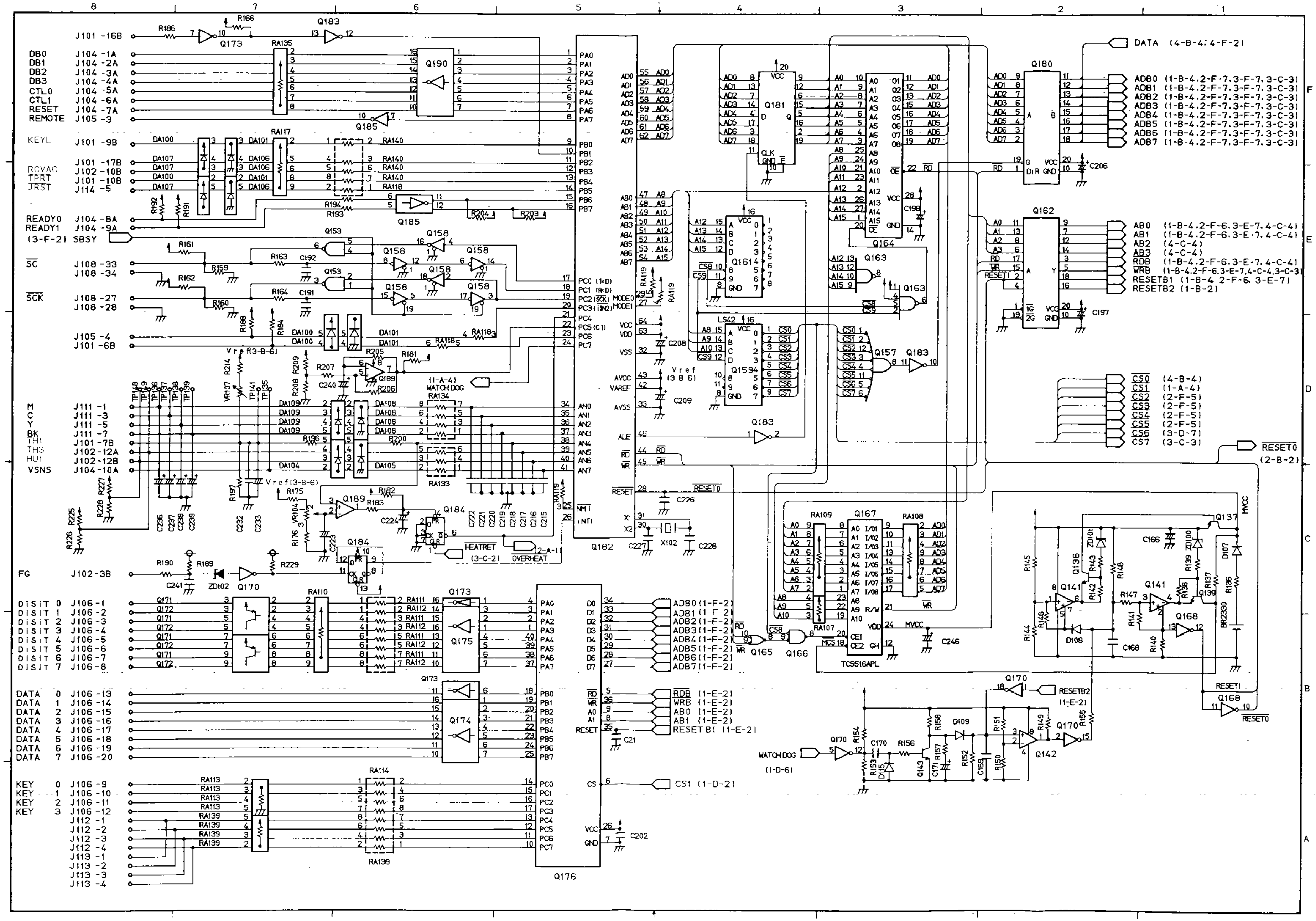

J805-2
J805-10
J803 (J03)
J802 (J02)
J87-1
J87-2
J87-3
ET30
J87-4
ET59
J105-4
J201S-2
ET32
Magenta toner sensor
Cleaning brush motor
Image leading edge sensor
Transfer drum home position sensor
Separation unit paper sensor
Transfer drum paper sensor
Q23
Q20
M11
Q15
Q16
Q17
Q18
J55
J46
J40
J41
J42
J43
J44
J45
J85
J39
J74-2
ET29
J803-6
J806-2
J203-10B
J104
ET28
(J803-3)
J104-5B
Main motor
Drum motor
FG (M2)
FG (M1)
M1
M2
J403M
J404M
Motor driver PCB
J401M
J402M (6P)
ET58
J86-7
J88-3
J806-4
J803-3
ET59
ET14
(J806-2)
J102
J101 (40P)
Scanning mirror drive motor M3
J202S (6P)
J203S (14P)
Scanner driver PCB
J201S (2P)
J204S
ET32
J802-1
J110 (8P)
SCNRDY
RET (0V)
SCNON
ET27
RMHAC1
RMHAC2
RMHAC3
J907
J908
Controller PCB
J107
J106 (20P)
J111 (8P)
J112 (5P)
J401 (20P)
J403 (8P)
Display PCB
J404 (5P)
J402 (6P)
ET6
ET20
+12VH
-12VJ
ET8
ET16
ET15
ET20
J501
Toner concentration sensor PCB
Filter select solenoid
Toner concentration sensor lamp
LA1
SL21
J62-1
J63-2
J86-9
J208-7
ET5
J208-1
J101 (40P)
ET22
ET32
J9
J805-5
J805-1
ET37
ET34
ET35
J88
J18
J19
J20
J21
J22
Q5
Q6
Q7
Q8
Q9
Manual feed unit paper sensor
Upper cassette paper sensor
Lower cassette paper sensor
Upper cassette "Full" position sensor
Lower cassette "Full" position sensor
J16
J17
SW 701
SW 702
SW 703
SW 704
Upper cassette size sensor PCB
Lower cassette size sensor PCB
J103 (50P)
J202 (50P)
J203 (40P)
J204
J8A
J14
J15
J12
J13
J10
J11
SL1
SL2
CL1
CL2
CL3
CL4
Upper pick-up roller engage solenoid
Lower pick-up roller engage solenoid
Upper cassette paper sensor
Lower cassette paper sensor
Upper pick-up roller clutch
Lower pick-up roller clutch
J48
J806-3
J144-3
J806-1
ET59
J102-7B
SW5
J49
M3
Developing unit drive motor
J59
CL5
Magenta toner feed screw clutch
Cyan toner feed
Yellow toner sensor
Cyan toner sensor
Magenta toner sensor
Black toner sensor
Q27
Q29
Q28
Q30
J1002
J1001
J84
J85
J1004
J1003



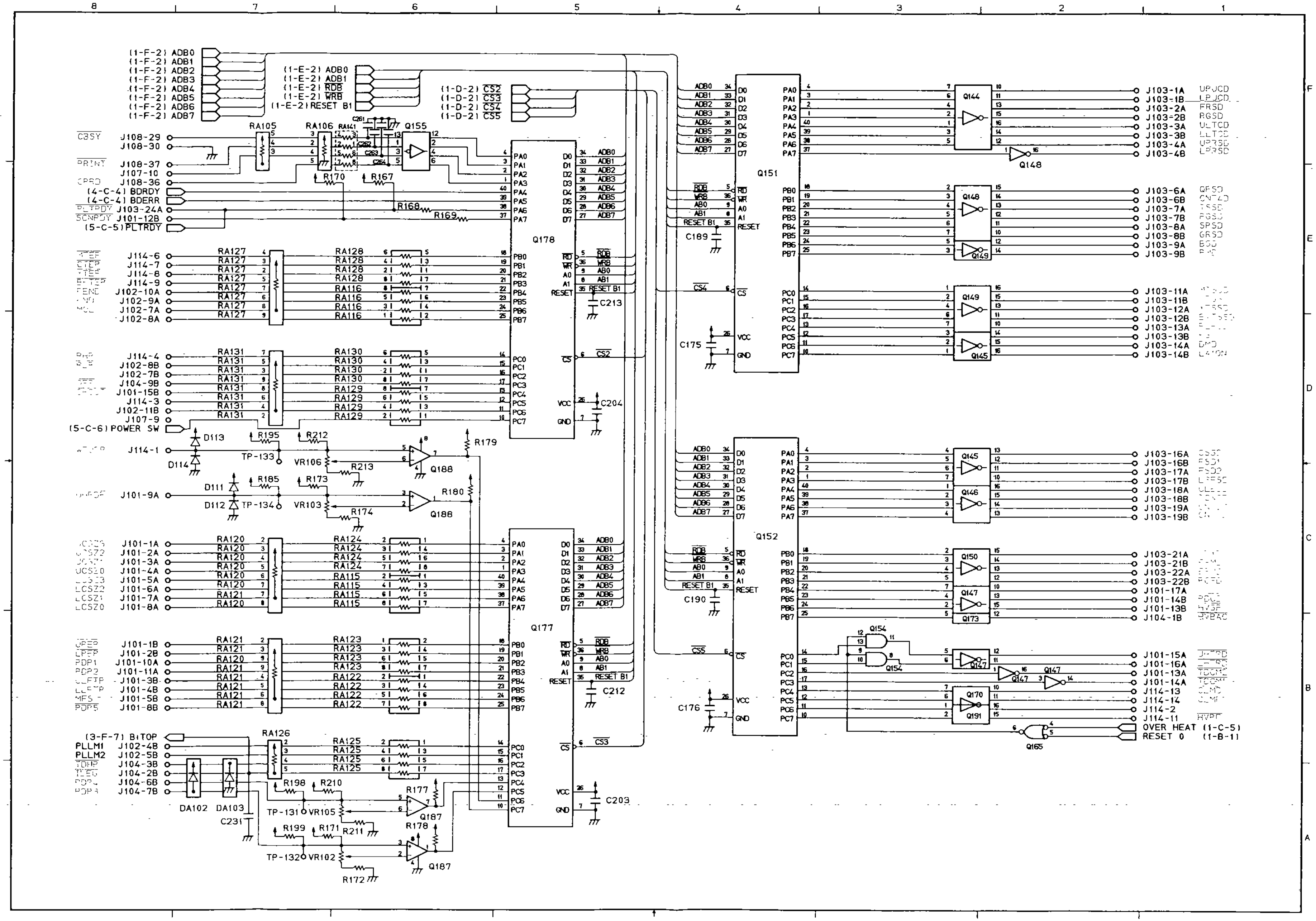
Turret motor
M4
J907
Turret power supply PCB
J908
+24V
0V
+5V
GND
CLK
J904
J905
J906
Turret motor controller PCB
CNA
CNB
or M3
J204S
SCNRDY
RET (0V)
SCNON
ET27
RMHAC1
RMHAC2
RMHAC3
RMD
S.RESET
H.RESET
MOL
ENL
PEND
GND
ANGL
RMS
HOME
ET59
ET11
Environment measurement PCB
G
24V
GND
J902-2
J901-1
Oil level sensor PCB
J601
+5VC
0VC
ET23
ET27
Turret home position sensor
Q13
J66
ET15
ET29
J86-8
ET60
J88-7
LED1
Power switch lamp
J72
+5
0V
Turret lock release sensor
lock release solenoid
Belt winding solenoid
Delivery unit paper solenoid
Q12
SL16
Q4
SL7
J52
J82
J4
+24VF
ET58
ET22
ET25
ET7
sensor
Q19
Feed roller paper sensor
Registration roller paper sensor
Fast feed solenoid
Q10
Q11
SL3
SL4
SL5
J25
J24
J26
J27
J77
J78
J79
J23
ET 22
ET 25
Pre-cleaning exposure LED
LAS1
J51
ET5
J101 (40P)
J102 (24P)
J114
J104
J102
J109 (3P)
LDK
LDA
Laser unit
J102
J114 (18P)
J48-4
CLMF
CLMD
J206
J201 (9P)
OVF
+5VC
OVE
5VE
OVC
-5VD
J804-1
ET18
ET19
ET17
J83
Jam reset switch
SW6
J97-1
ET16
J209
J204
TH
PE1
J205 (4P)
J203
DC driver PCB
J207
J208
J203 (40P)
J210
J206
J209
J102-7B
J59
J65
SL21
J62-2
CNT1D
CNT2D
CNT3D
CNT4D
J805-4
J805-3
LSFSD
FSD1
FSD2
+12V
GND
ET66
ET67
IEFMD
ET26
ET14
ET49
ET48
ET50
ET52
J47
J28
J6
J29
J31
J30
J68
J94
SW5
M12
Corona wire cleaning unit motor
CL5
CL6
CL7
CL8
Magenta toner feed screw clutch
Cyan toner feed screw clutch
Yellow toner feed screw clutch
Black toner feed screw clutch
CNT1
CNT2
CNT3
CNT4
Total counter
SL11
SL12
SL13
SL14
SL15
SL8
SL9
S10
SL6
Feeder drive unit solenoid
M7
M8
M5
M14
Primary cooling fan
Inner exhaust fan
24V
(J806-2)
J86-1
J88-4
SW7, 8
ET21
RL1
ET23
ET19
J87-3
5V
(J803-3)
J87-2
ET28
J88-5
ET24
(J805-7)
Q15, 16, 17, 18
Q26, 13 motor driver PCB
Q20, 21, 22, 23, 27, 28, 29, 30
RL2
24V
(J807-1)
ET9
J708-3
Potential controller PCB
(J805-6)

D. DC CONTROLLER CIRCUIT DIAGRAM

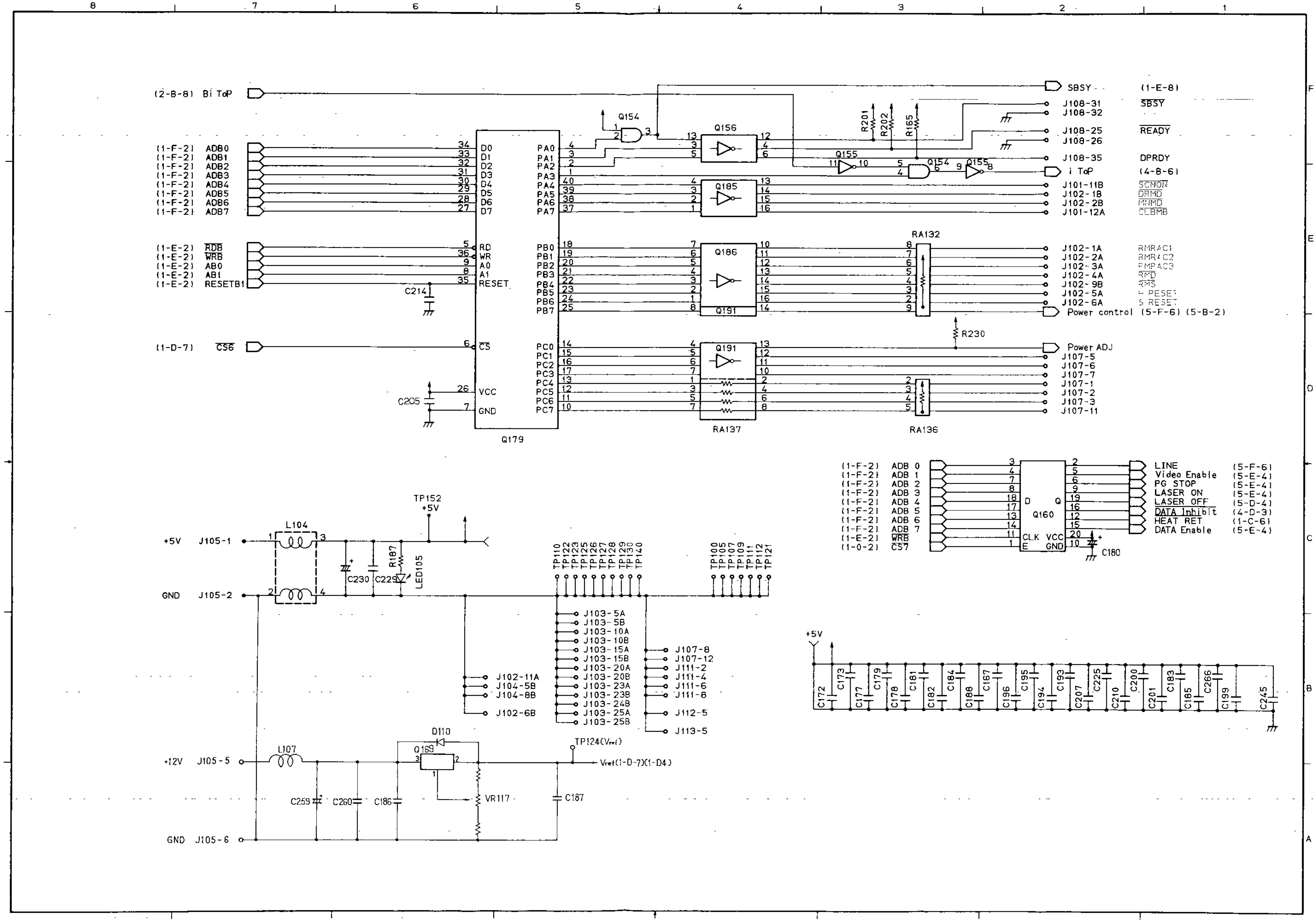
DC CONTROLLER CIRCUIT DIAGRAM (1/5)


DB0 J104 -1A
DB1 J104 -2A
DB2 J104 -3A
DB3 J104 -4A
CTL0 J104 -5A
CTL1 J104 -6A
RESET J104 -7A
REMOTE J105 -3
J101 -16B
KEYL J101 -9B
RCVAC J101 -17B
TPRT J102 -10B
JRST J101 -10B
J114 -5
READY0 J104 -8A
READY1 J104 -9A
(3-F-2) SBSY
SC J108 -33
J108 -34
SCK J108 -27
J108 -28
J105 -4
J101 -6B
M J111 -1
C J111 -3
Y J111 -5
BK J111 -7
TH1 J101 -7B
TH3 J102 -12A
HU1 J102 -12B
VSNS J104 -10A
FG J102 -3B
DIGIT 0 J106 -1
DIGIT 1 J106 -2
DIGIT 2 J106 -3
DIGIT 3 J106 -4
DIGIT 4 J106 -5
DIGIT 5 J106 -6
DIGIT 6 J106 -7
DIGIT 7 J106 -8
DATA 0 J106 -13
DATA 1 J106 -14
DATA 2 J106 -15
DATA 3 J106 -16
DATA 4 J106 -17
DATA 5 J106 -18
DATA 6 J106 -19
DATA 7 J106 -20
KEY 0 J106 -9
KEY 1 J106 -10
KEY 2 J106 -11
KEY 3 J106 -12
J112 -1
J112 -2
J112 -3
J112 -4
J113 -1
J113 -2
J113 -3
J113 -4
Q173
Q183
Q190
Q185
Q153
Q158
Q189
Q184
Q170
Q182
Q181
Q164
Q161
Q163
Q159
Q157
Q180
Q162
Q167
TC5516APL
Q165
Q166
Q175
Q174
Q176
Q137
Q138
Q141
Q139
Q168
Q142
Q143
WATCH DOG (1-A-4)
HEATRET (3-C-2)
OVERHEAT (2-A-1)
Vref (3-B-6)
DATA (4-B-4, 4-F-2)
ADB0 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB1 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB2 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB3 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB4 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB5 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB6 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
ADB7 (1-B-4, 2-F-7, 3-F-7, 3-C-3)
AB0 (1-B-4, 2-F-6, 3-E-7, 4-C-4)
AB1 (1-B-4, 2-F-6, 3-E-7, 4-C-4)
AB2 (4-C-4)
AB3 (4-C-4)
RDB (1-B-4, 2-F-6, 3-E-7, 4-C-4)
WRB (1-B-4, 2-F-6, 3-E-7, 4-C-4, 3-C-3)
RESETB1 (1-B-4, 2-F-6, 3-E-7)
RESETB2 (1-B-2)
CS0 (4-B-4)
CS1 (1-A-4)
CS2 (2-F-5)
CS3 (2-F-5)
CS4 (2-F-5)
CS5 (2-F-5)
CS6 (3-D-7)
CS7 (3-C-3)
RESET0 (2-B-2)
ADB0 (1-F-2)
ADB1 (1-F-2)
ADB2 (1-F-2)
ADB3 (1-F-2)
ADB4 (1-F-2)
ADB5 (1-F-2)
ADB6 (1-F-2)
ADB7 (1-F-2)
RDB (1-E-2)
WRB (1-E-2)
AB0 (1-E-2)
AB1 (1-E-2)
RESET B1 (1-E-2)
CS1 (1-D-2)
RESETB2 (1-E-2)
RESET1
RESET0
WATCH DOG (1-D-6)
MVCC

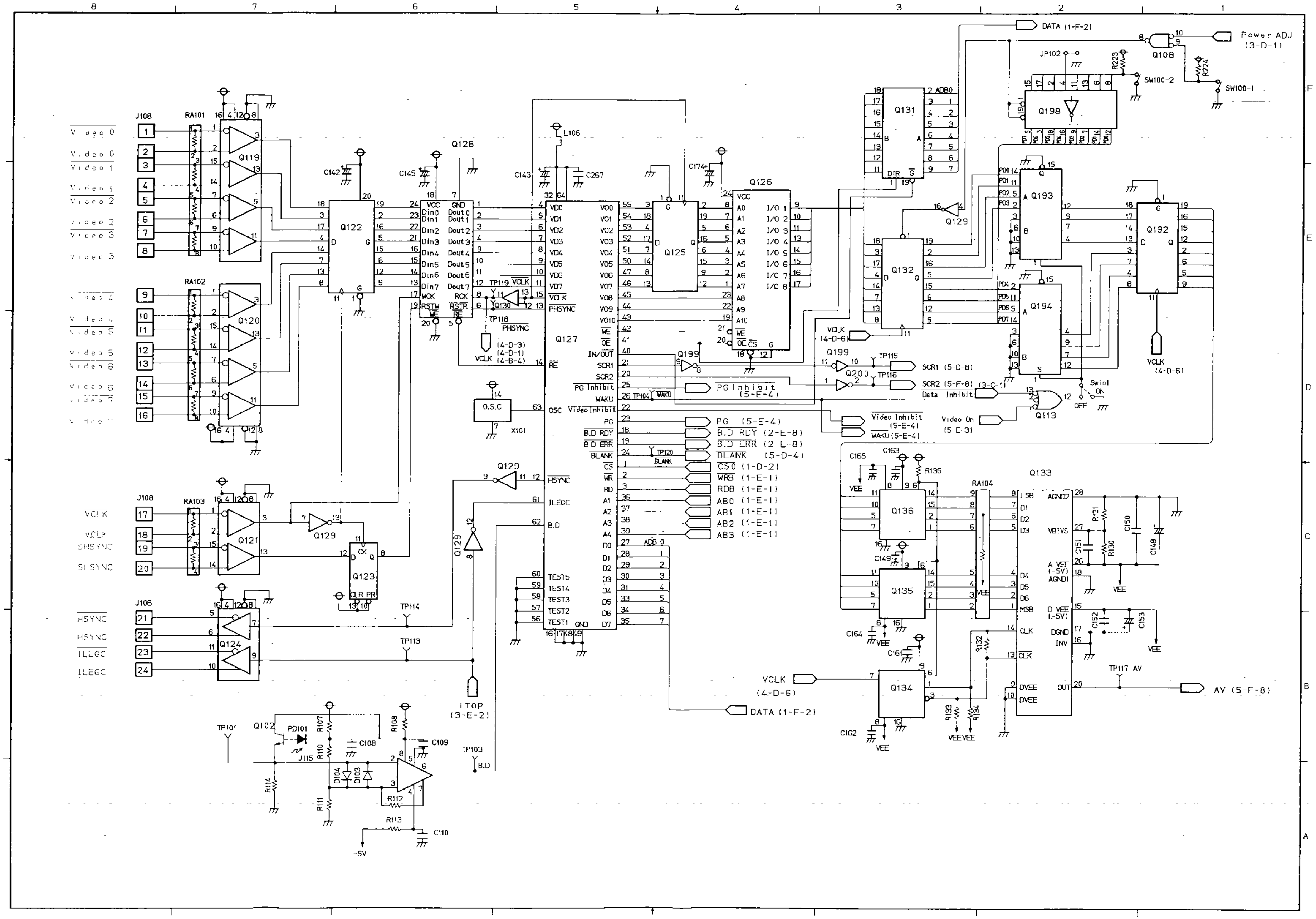
DC CONTROLLER CIRCUIT DIAGRAM (2/5)



8
7
6
5
4
3
2
1
F
E
D
C
B
A
(1-F-2) ADB0
(1-F-2) ADB1
(1-F-2) ADB2
(1-F-2) ADB3
(1-F-2) ADB4
(1-F-2) ADB5
(1-F-2) ADB6
(1-F-2) ADB7
(1-E-2) ADB0
(1-E-2) ADB1
(1-E-2) RDB
(1-E-2) WRB
(1-E-2) RESET B1
(1-D-2) CS2
(1-D-2) CS3
(1-D-2) CS4
(1-D-2) CS5
RA105
RA106
Q155
R170
R167
R168
R169
J108-29
J108-30
J108-37
J107-10
J108-36
(4-C-4) BDRDY
(4-C-4) BDERR
J103-24A
J101-12B
(5-C-5) PLTRDY
Q178
Q177
Q151
Q152
RA127
RA128
RA116
RA131
RA130
RA129
RA120
RA124
RA115
RA121
RA123
RA122
RA126
RA125
J114-6
J114-7
J114-8
J114-9
J102-10A
J102-9A
J102-7A
J102-8A
J114-4
J102-8B
J102-7B
J104-9B
J101-15B
J114-3
J102-11B
J107-9
(5-C-6) POWER SW
D113
D114
R195
R212
TP-133
VR106
R213
R179
Q188
J114-1
D111
D112
R185
R173
TP-134
VR103
R174
R180
J101-9A
J101-1A
J101-2A
J101-3A
J101-4A
J101-5A
J101-6A
J101-7A
J101-8A
J101-1B
J101-2B
J101-10A
J101-11A
J101-3B
J101-4B
J101-5B
J101-8B
(3-F-7) BiTOP
PLLM1 J102-4B
PLLM2 J102-5B
J104-3B
J104-2B
J104-6B
J104-7B
DA102
DA103
C231
R198
R210
TP-131
VR105
R211
R177
R178
Q187
R199
R171
TP-132
VR102
R172
C213
C204
C212
C203
C189
C175
C190
C176
Q144
Q148
Q149
Q145
Q146
Q150
Q147
Q173
Q154
Q170
Q191
Q165
J103-1A
J103-1B
J103-2A
J103-2B
J103-3A
J103-3B
J103-4A
J103-4B
J103-6A
J103-6B
J103-7A
J103-7B
J103-8A
J103-8B
J103-9A
J103-9B
J103-11A
J103-11B
J103-12A
J103-12B
J103-13A
J103-13B
J103-14A
J103-14B
J103-16A
J103-16B
J103-17A
J103-17B
J103-18A
J103-18B
J103-19A
J103-19B
J103-21A
J103-21B
J103-22A
J103-22B
J101-17A
J101-14B
J101-13B
J104-1B
J101-15A
J101-16A
J101-13A
J101-14A
J114-13
J114-14
J114-2
J114-11
OVER HEAT (1-C-5)
RESET 0 (1-B-1)
UPJCD
LPJCD
FRSD
RGSD
ULTCD
LLTCD
UPRSD
LPRSD
GFSD
FSSD
GRSD
FRPD
HVPT


(2-B-8) Bi ToP
SBSY (1-E-8)
J108-31 SBSY
J108-32
J108-25 READY
J108-26
J108-35 DPRDY
i ToP (4-B-6)
J101-11B SCNON
J102-1B DRMD
J102-2B MNMD
J101-12A CLBMB
(1-F-2) ADB0
(1-F-2) ADB1
(1-F-2) ADB2
(1-F-2) ADB3
(1-F-2) ADB4
(1-F-2) ADB5
(1-F-2) ADB6
(1-F-2) ADB7
(1-E-2) RDB
(1-E-2) WRB
(1-E-2) AB0
(1-E-2) AB1
(1-E-2) RESETB1
(1-D-7) CS6
C214
C205
Q179
Q154
Q155
Q156
Q185
Q186
Q191
RA132
RA136
RA137
R201
R202
R165
R230
J102-1A RMRAC1
J102-2A RMRAC2
J102-3A EMPAC3
J102-4A RMD
J102-9B RMS
J102-5A F RESET
J102-6A S RESET
Power control (5-F-6) (5-B-2)
Power ADJ
J107-5
J107-6
J107-7
J107-1
J107-2
J107-3
J107-11
(1-F-2) ADB 0
(1-F-2) ADB 1
(1-F-2) ADB 2
(1-F-2) ADB 3
(1-F-2) ADB 4
(1-F-2) ADB 5
(1-F-2) ADB 6
(1-F-2) ADB 7
(1-E-2) WRB
(1-D-2) CS7
Q160
LINE (5-F-6)
Video Enable (5-E-4)
PG STOP (5-E-4)
LASER ON (5-E-4)
LASER OFF (5-D-4)
DATA Inhibit (4-D-3)
HEAT RET (1-C-6)
DATA Enable (5-E-4)
C180
TP152 +5V
L104
+5V J105-1
GND J105-2
C230
C229
R187
LED105
TP110 TP122 TP123 TP125 TP126 TP127 TP128 TP129 TP130 TP140
TP100 TP105 TP107 TP109 TP111 TP112 TP121
J103-5A
J103-5B
J103-10A
J103-10B
J103-15A
J103-15B
J103-20A
J103-20B
J103-23A
J103-23B
J103-24B
J103-25A
J103-25B
J107-8
J107-12
J111-2
J111-4
J111-6
J111-8
J112-5
J113-5
J102-11A
J104-5B
J104-8B
J102-6B
+12V J105-5
GND J105-6
L107
D110
Q169
TP124(Vref)
Vref(1-D-7)(1-D4)
C259
C260
C186
VR117
C187
+5V
C172 C173 C177 C179 C178 C181 C182 C184 C188 C167 C196 C195 C194 C193 C207 C225 C210 C200 C201 C183 C185 C266 C199 C245
8 7 6 5 4 3 2 1
F E D C B A

DC CONTROLLER CIRCUIT DIAGRAM (4/5)



J108
RA101
RA102
RA103
Video 0
Video 1
Video 2
Video 3
Video 4
Video 5
Video 6
Video 7
VCLK
HSYNC
ILEGC
Q119
Q120
Q121
Q122
Q123
Q124
Q125
Q126
Q127
Q128
Q129
Q130
Q131
Q132
Q133
Q134
Q135
Q136
Q192
Q193
Q194
Q198
Q199
Q200
Q108
Q113
Q102
C142
C145
C143
C267
C174
L106
TP118
TP119
TP120
TP104
TP114
TP113
TP101
TP103
TP115
TP116
TP117 AV
PHSYNC
VCLK (4-D-3) (4-D-1) (4-B-4)
O.S.C
X101
DATA (1-F-2)
Power ADJ (3-D-1)
JP102
R223
R224
SW100-2
SW100-1
SCR1 (5-D-8)
SCR2 (5-F-8) (3-C-1)
Data Inhibit
PG Inhibit (5-E-4)
Video Inhibit (5-E-4)
WAKU (5-E-4)
Video On (5-E-3)
PG (5-E-4)
B.D RDY (2-E-8)
B.D ERR (2-E-8)
BLANK (5-D-4)
CS0 (1-D-2)
WRG (1-E-1)
RDB (1-E-1)
AB0 (1-E-1)
AB1 (1-E-1)
AB2 (1-E-1)
AB3 (1-E-1)
Swiol ON OFF
VCLK (4-D-6)
ITOP (3-E-2)
RA104
C165
C163
R135
C149
C164
C161
C162
R132
R133
R134
R131
R130
C150
C151
C148
C152
C153
VEE
AV (5-F-8)
PD101
J115
R107
R108
R110
R111
R112
R113
R114
D104
D103
C108
C109
C110
-5V
B.D

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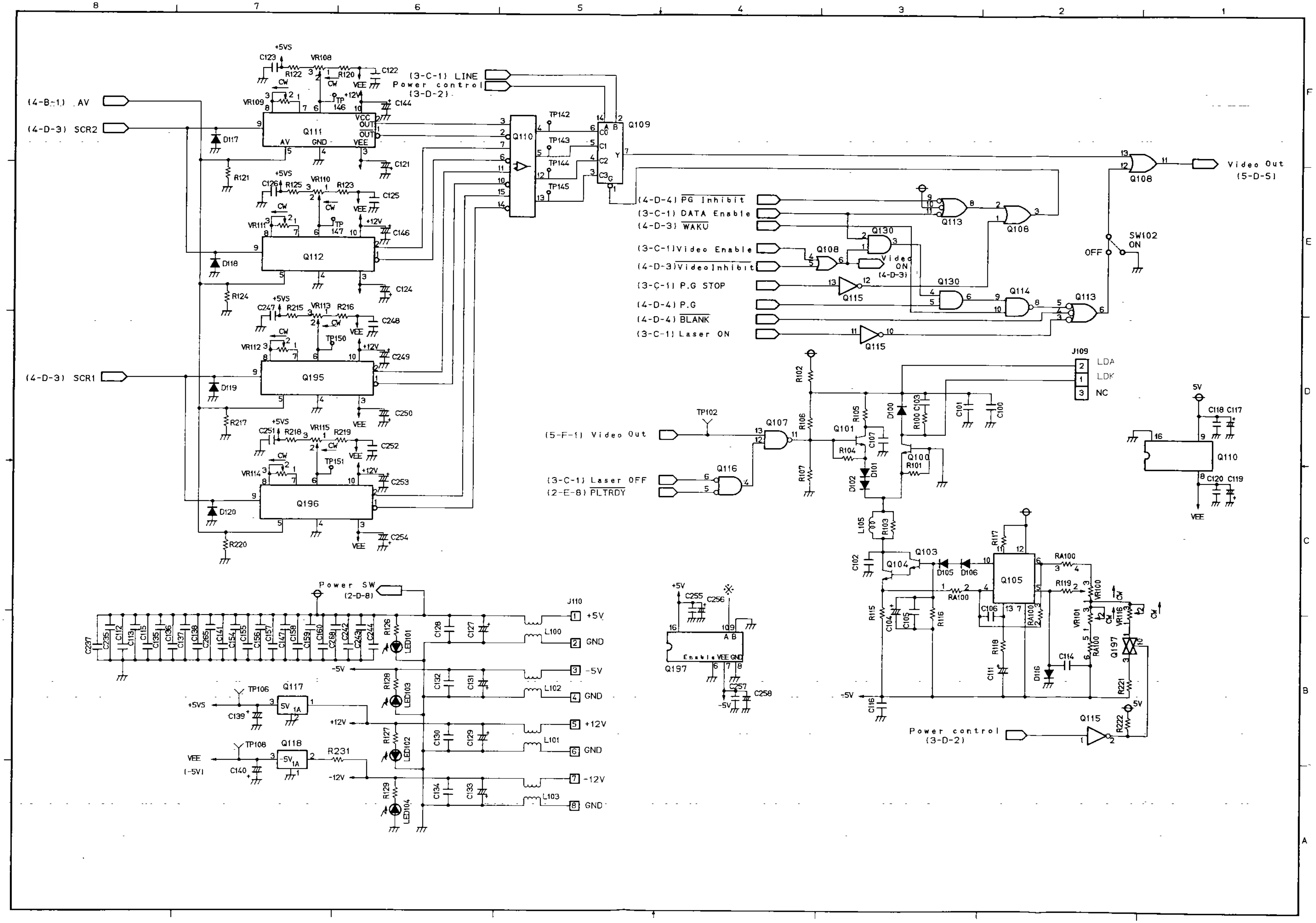
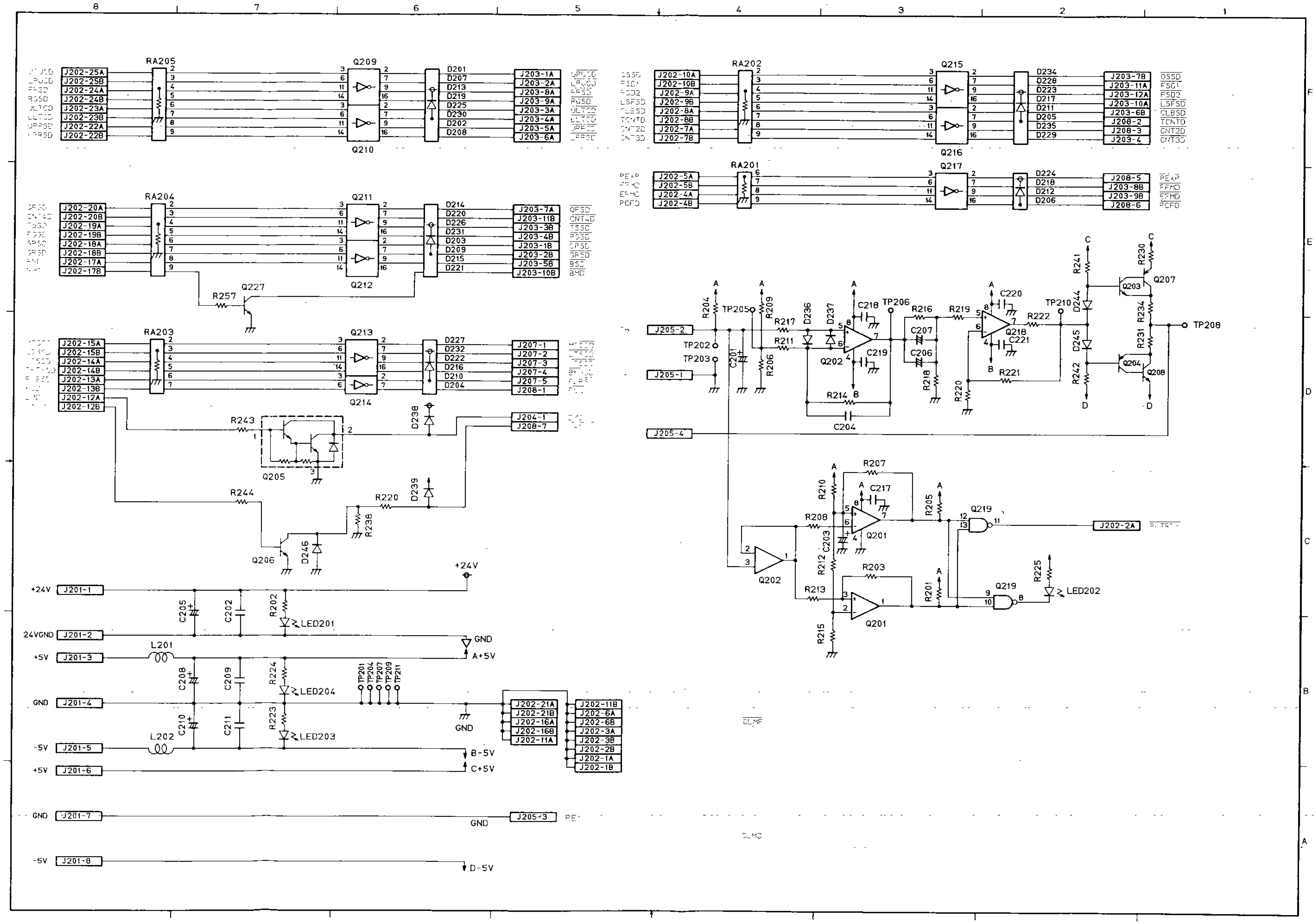
DC CONTROLLER CIRCUIT DIAGRAM (5/5)


(4-B-1) AV
(4-D-3) SCR2
(4-D-3) SCR1
(3-C-1) LINE
Power control (3-D-2)
Q111
Q112
Q195
Q196
Q110
Q109
TP142
TP143
TP144
TP145
Video Out (5-D-5)
Q108
(4-D-4) PG Inhibit
(3-C-1) DATA Enable
(4-D-3) WAKU
(3-C-1) Video Enable
(4-D-3) Video Inhibit
(3-C-1) P.G STOP
(4-D-4) P.G
(4-D-4) BLANK
(3-C-1) Laser ON
Q113
Q130
Q114
Q115
SW102
OFF
ON
Video ON (4-D-3)
J109
LDA
LDK
NC
TP102
(5-F-1) Video Out
Q107
Q101
Q100
(3-C-1) Laser OFF
(2-E-8) PLTRDY
Q116
Q103
Q104
Q105
Q197
Power control (3-D-2)
Power SW (2-D-8)
J110
+5V
GND
-5V
GND
+12V
GND
-12V
GND
L100
L101
L102
L103
LED101
LED102
LED103
LED104
Q117
Q118
TP106
TP108
+5VS
VEE (-5V)
5V 1A
-5V 1A
R231
Enable VEE GND

CANON COLOR LASER COPIER REV.1 JUNE 1987 PRINTED IN JAPAN (IMPRIME AU JAPON)

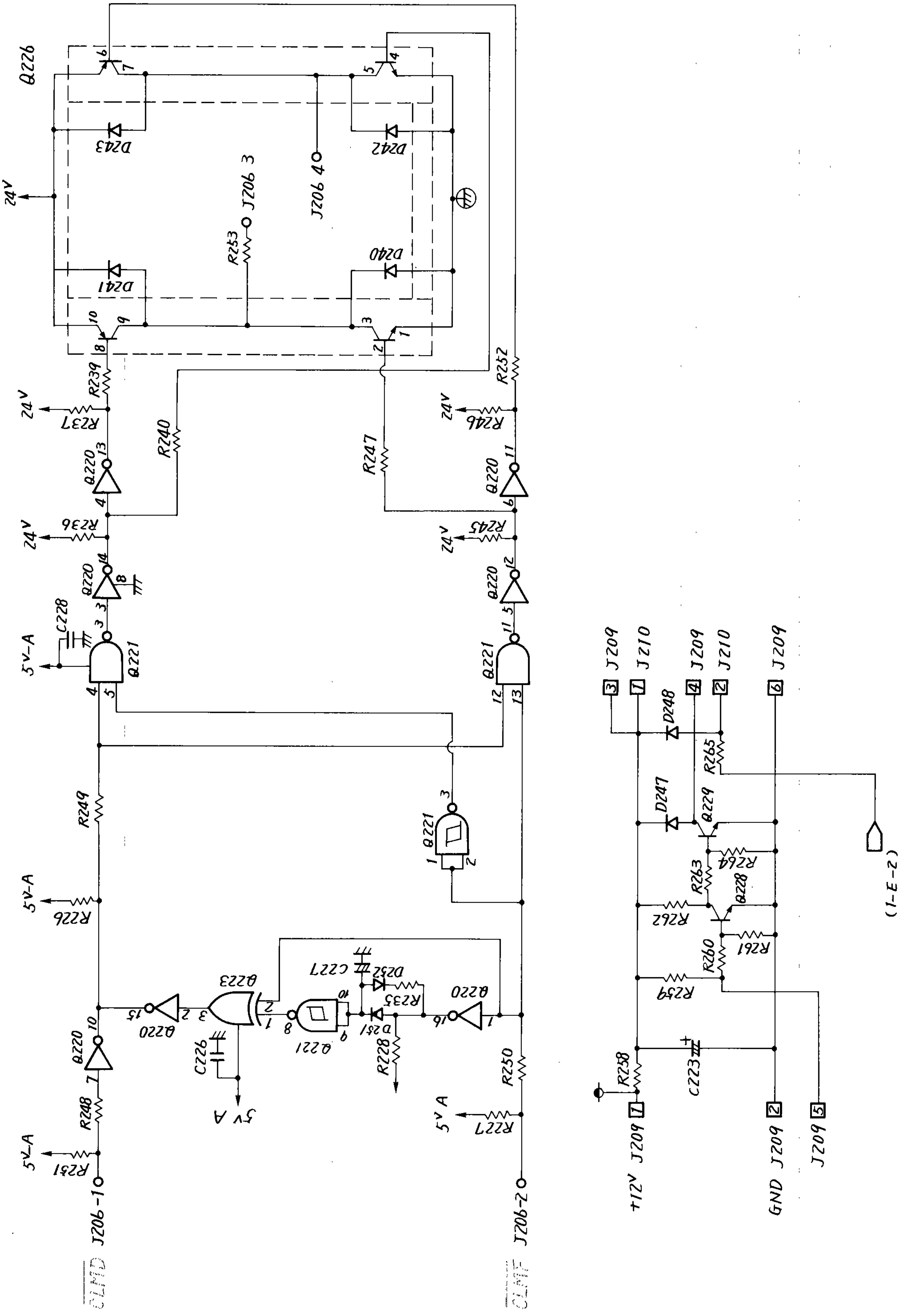
E. DC DRIVER CIRCUIT DIAGRAM

DC DRIVER CIRCUIT DIAGRAM (1/2)

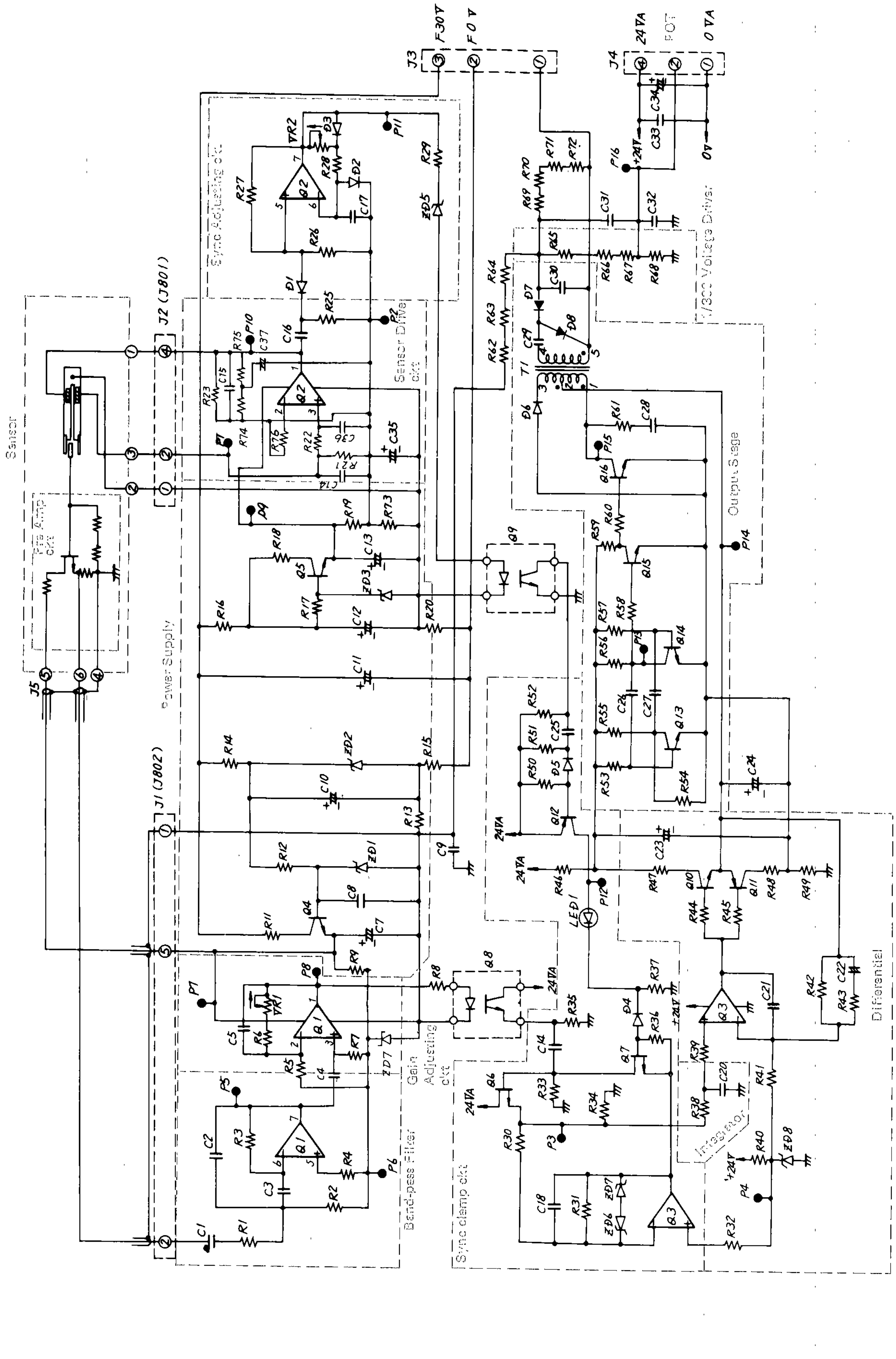


RA205
Q209
Q210
J202-25A
J202-25B
J202-24A
J202-24B
J202-23A
J202-23B
J202-22A
J202-22B
D201
D207
D213
D219
D225
D230
D202
D208
J203-1A
J203-2A
J203-8A
J203-9A
J203-3A
J203-4A
J203-5A
J203-6A
RA204
Q211
Q212
J202-20A
J202-20B
J202-19A
J202-19B
J202-18A
J202-18B
J202-17A
J202-17B
D214
D220
D226
D231
D203
D209
D215
D221
J203-7A
J203-11B
J203-3B
J203-4B
J203-1B
J203-2B
J203-5B
J203-10B
R257
Q227
RA203
Q213
Q214
J202-15A
J202-15B
J202-14A
J202-14B
J202-13A
J202-13B
J202-12A
J202-12B
D227
D232
D222
D216
D210
D204
J207-1
J207-2
J207-3
J207-4
J207-5
J208-1
R243
Q205
D238
J204-1
J208-7
R244
R220
D239
R238
Q206
D246
RA202
Q215
Q216
J202-10A
J202-10B
J202-9A
J202-9B
J202-8A
J202-8B
J202-7A
J202-7B
D234
D228
D223
D217
D211
D205
D235
D229
J203-7B
J203-11A
J203-12A
J203-10A
J203-6B
J208-2
J208-3
J203-4
OSSD
FSD1
FSD2
LSFSD
CLBSD
TCNTD
CNT2D
CNT3D
RA201
Q217
J202-5A
J202-5B
J202-4A
J202-4B
D224
D218
D212
D206
J208-5
J203-8B
J203-9B
J208-6
J205-2
J205-1
J205-4
TP202
TP203
TP205
TP206
TP210
TP208
R204
R209
R206
C201
R217
R211
D236
D237
Q202
C218
C219
R214
C204
R216
C207
C206
R218
R219
C220
Q218
C221
R220
R221
R222
R241
D244
D245
R242
Q203
Q204
R230
R234
R231
Q207
Q208
A
B
C
D
R207
R210
C217
R208
Q201
C203
R212
R205
Q219
J202-2A
R203
R213
R215
R201
R225
LED202
+24V
J201-1
24VGND
J201-2
+5V
J201-3
L201
C205
C202
R202
LED201
GND
A+5V
C208
C209
R224
LED204
TP201
TP204
TP207
TP209
TP211
J201-4
C210
C211
R223
LED203
L202
-5V
J201-5
B-5V
J201-6
C+5V
J202-21A
J202-21B
J202-16A
J202-16B
J202-11A
J202-11B
J202-6A
J202-6B
J202-3A
J202-3B
J202-2B
J202-1A
J202-1B
J201-7
J205-3
J201-8
D-5V
8
7
6
5
4
3
2
1
F
E
D
C
B
A

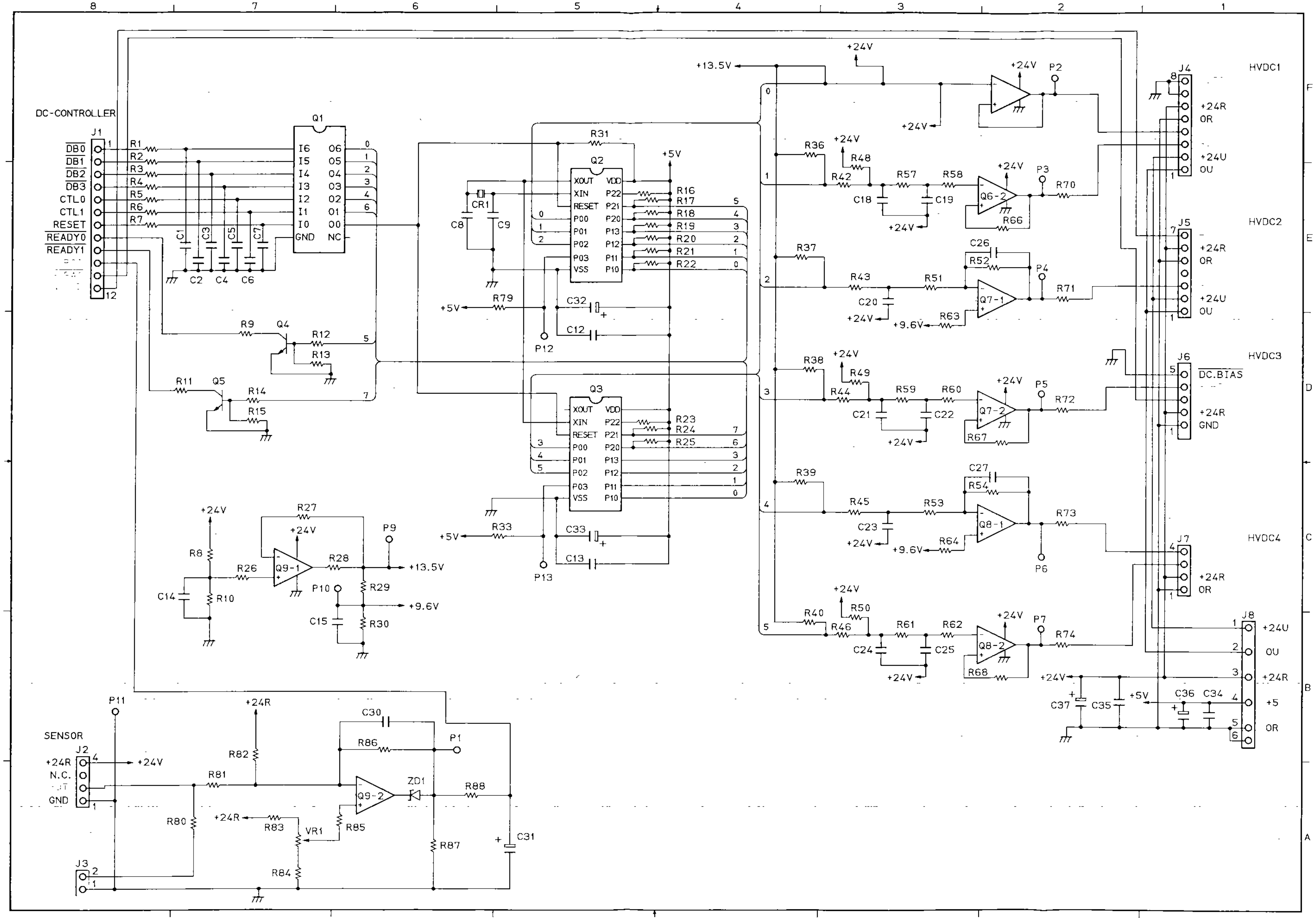
DC DRIVER CIRCUIT DIAGRAM (2/2)


Q226
D243
D242
D241
D240
24V
J206 3
J206 4
R253
R239
R237
R240
R247
R252
R246
Q220
R236
R245
C228
5V-A
Q221
R249
R226
Q223
C226
C227
D252
D251
R235
R228
R250
R227
5V A
R248
R231
J206-1
J206-2
CLMD
CLMF
J209
J210
D248
D247
R265
Q229
R264
R263
Q228
R262
R261
R260
R259
R258
C223
+12V
GND
(1-E-2)

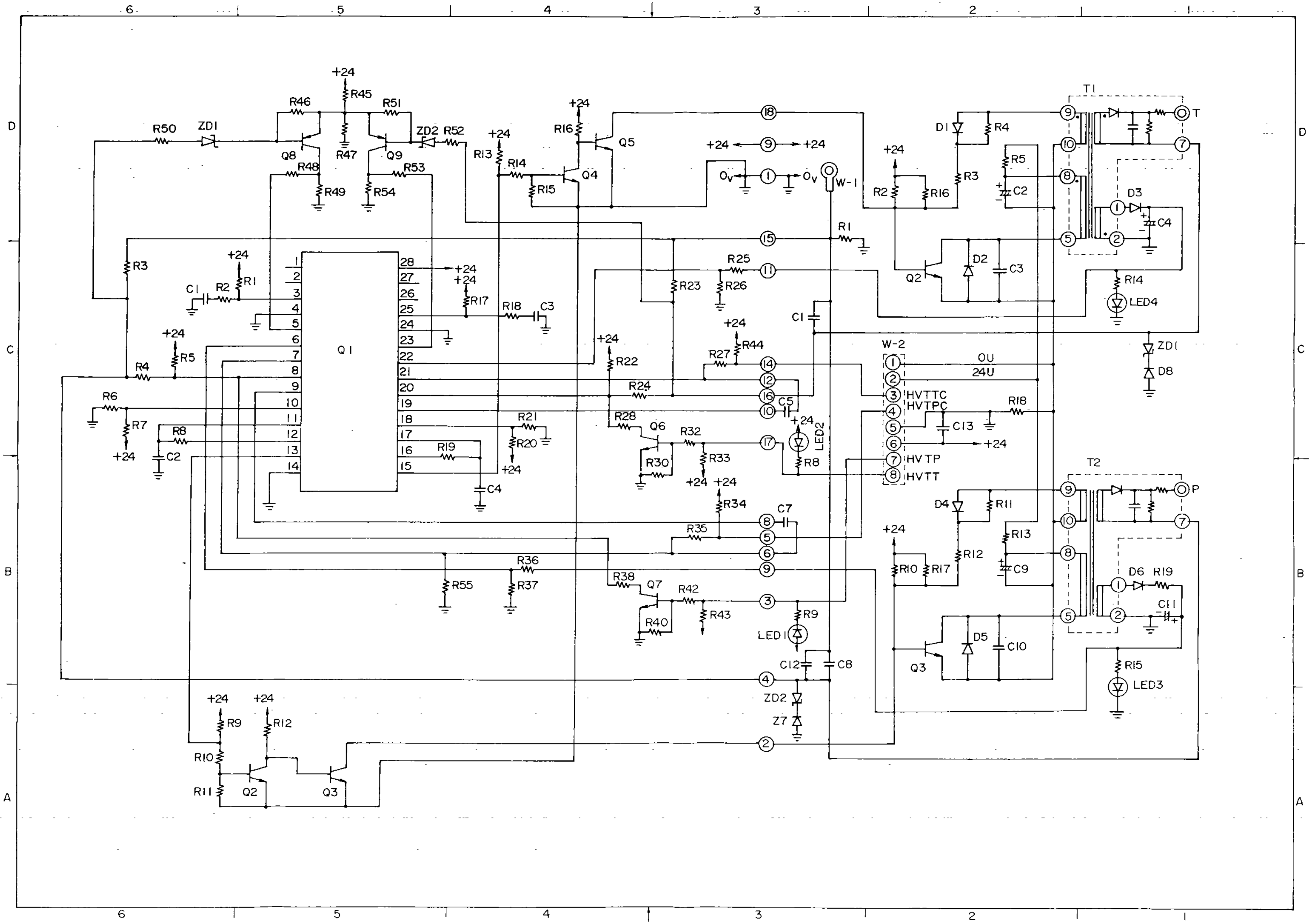
F. POTENTIAL MEASURING CIRCUIT DIAGRAM


Sensor
Pre Amp ckt
Power Supply
Sensor Drive ckt
Sync Adjusting ckt
Band-pass Filter
Gain Adjusting ckt
Sync clamp ckt
Integrator
Differential
Output Stage
1/300 Voltage Driver
J1 (J802)
J2 (J801)
J3
J4
J5
F30V
F0V
24VA
POT
0VA
+24V
0V
T1
Q1
Q2
Q3
Q4
Q5
Q8
Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16
VR1
VR2
LED1
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
P16

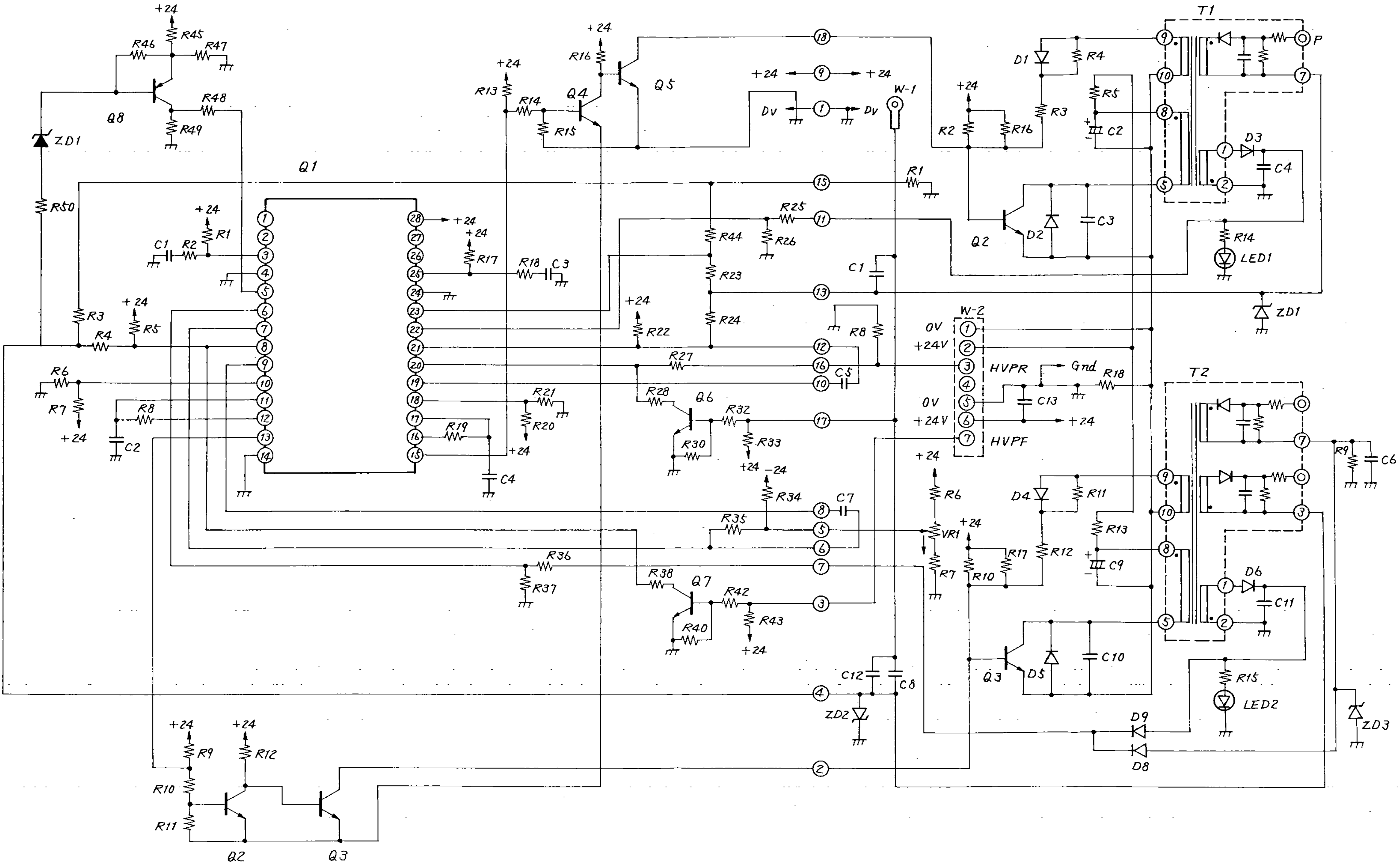
G. POTENTIAL CONTROL CIRCUIT DIAGRAM


DC-CONTROLLER
J1
DB0
DB1
DB2
DB3
CTL0
CTL1
RESET
READY0
READY1
Q1
Q2
Q3
Q4
Q5
Q9-1
Q9-2
Q6-2
Q7-1
Q7-2
Q8-1
Q8-2
+13.5V
+24V
+5V
+9.6V
+24R
HVDC1
HVDC2
HVDC3
HVDC4
J4
J5
J6
J7
J8
+24U
OU
OR
GND
DC.BIAS
+5
SENSOR
J2
J3
N.C.
P1
P2
P3
P4
P5
P6
P7
P9
P10
P11
P12
P13
CR1
ZD1
VR1

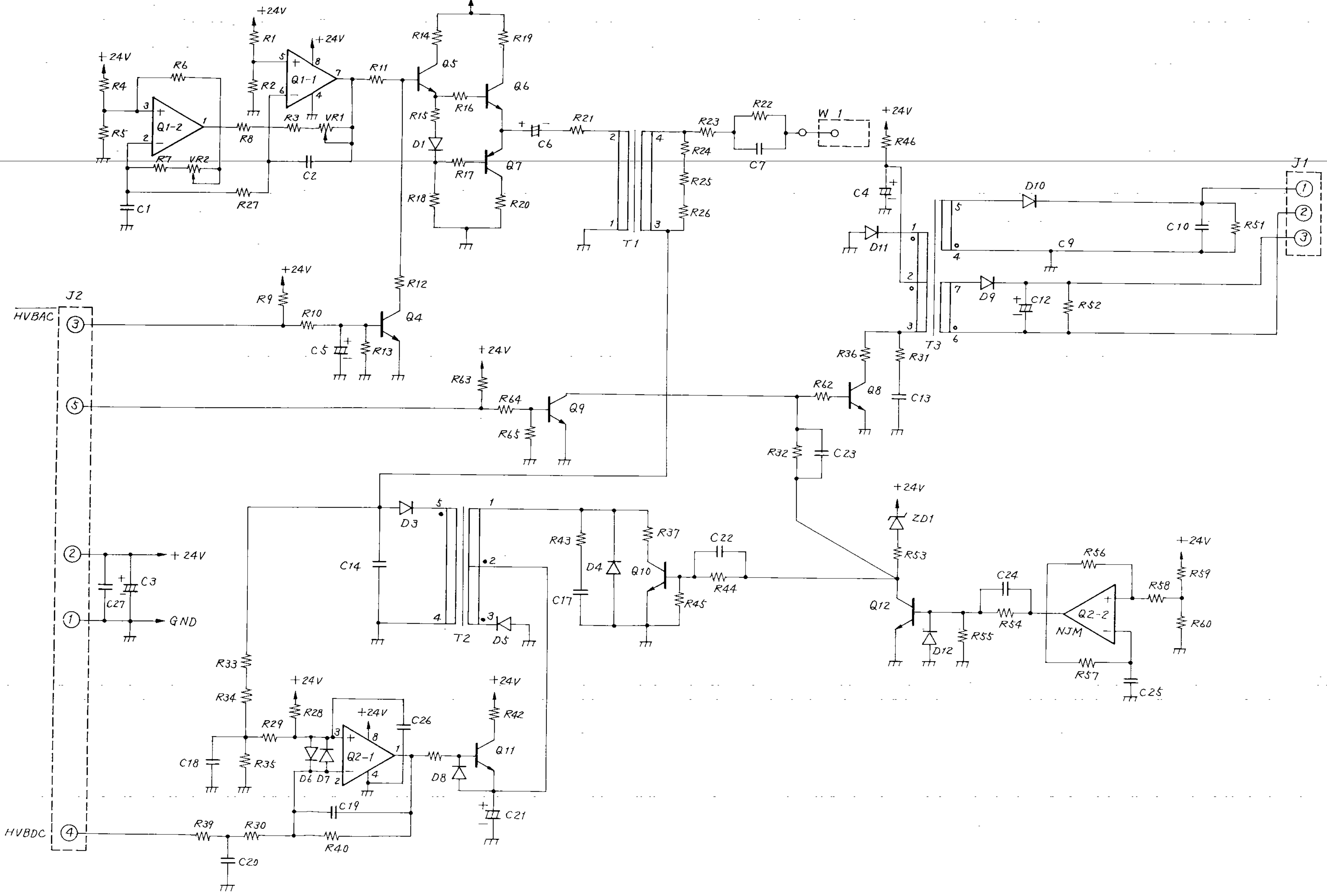
H. HVT-DC1 CIRCUIT DIAGRAM


6
5
4
3
2
1
D
C
B
A
+24
R45
R46
R51
R50
ZD1
ZD2
R52
Q8
R47
Q9
R48
R53
R49
R54
+24
R16
Q5
R13
R14
Q4
R15
18
+24
9
+24
0V
1
0V
W-1
15
R1
R3
+24
C1
R2
R1
Q1
28
+24
27
+24
26
R17
25
R18
C3
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
R23
R25
11
R26
C1
+24
R22
R27
R44
14
12
R24
16
C5
10
+24
R28
Q6
R32
17
LED2
R8
R30
R33
+24
+24
R34
C7
8
R35
5
6
R36
9
R55
R37
R38
Q7
R42
3
R9
R40
R43
LED1
C12
C8
4
ZD2
Z7
2
+24
R5
R4
R6
R7
+24
R8
C2
R21
R20
R19
+24
C4
+24
+24
R9
R12
R10
R11
Q2
Q3
T1
T
D1
R4
9
10
7
+24
R5
C2
R2
R16
R3
8
D3
1
C4
5
2
Q2
D2
C3
R14
LED4
ZD1
D8
W-2
1
OU
2
24U
3
HVTTC
4
HVTPC
R18
5
C13
6
+24
7
HVTP
8
HVTT
T2
9
P
D4
R11
10
7
R13
+24
R12
8
C9
R10
R17
D6
R19
1
C11
5
2
Q3
D5
C10
R15
LED3

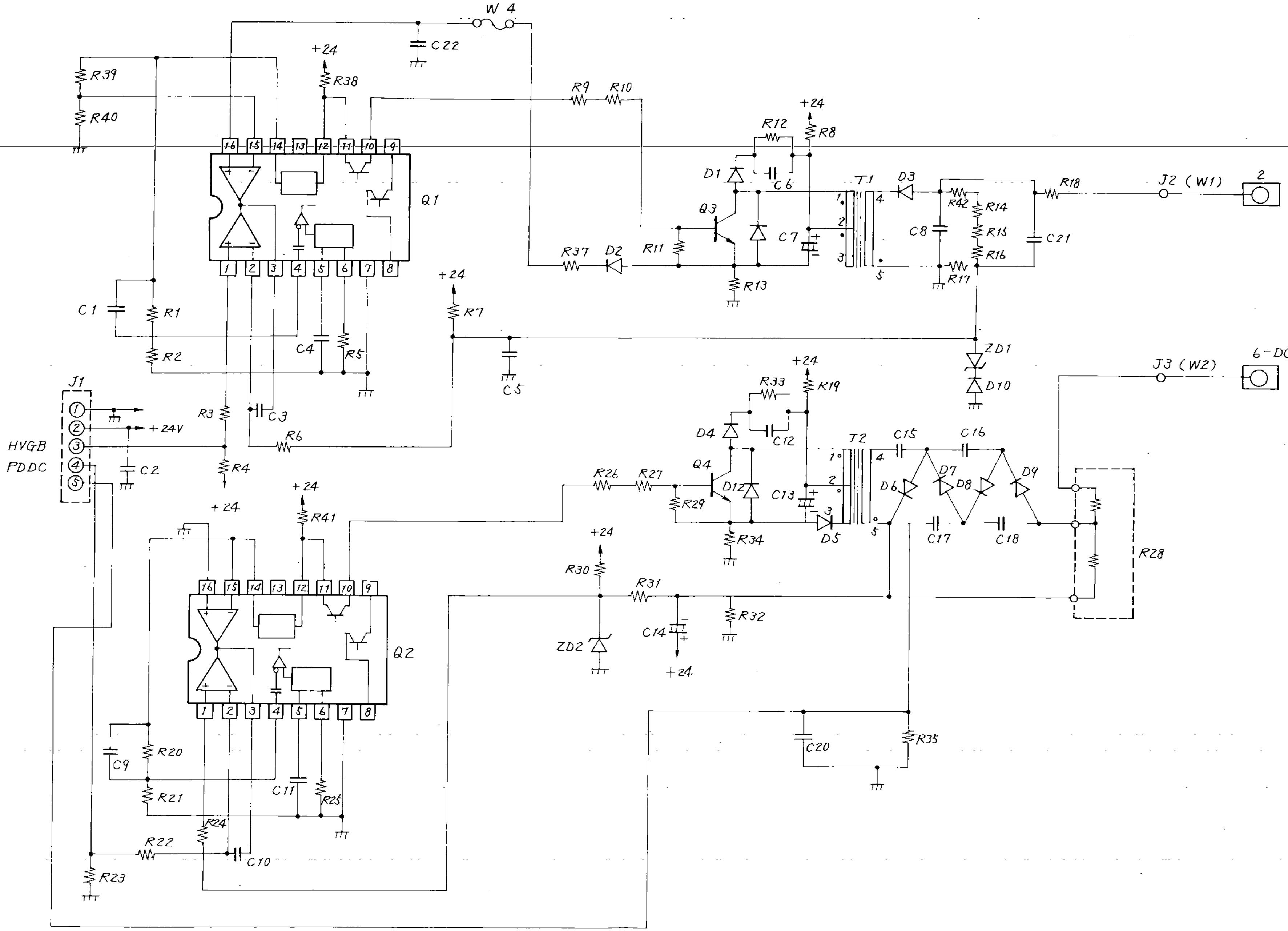
I. HVT-DC2 CIRCUIT DIAGRAM


Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
ZD1
ZD2
ZD3
R50
W-1
W-2
T1
T2
P
LED1
LED2
D1
D2
D3
D4
D5
D6
D8
D9
VR1
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R30
R32
R33
R34
R35
R36
R37
R38
R40
R42
R43
R44
R45
R46
R47
R48
R49
+24
Dv
0V
+24V
HVPR
HVPF
Gnd

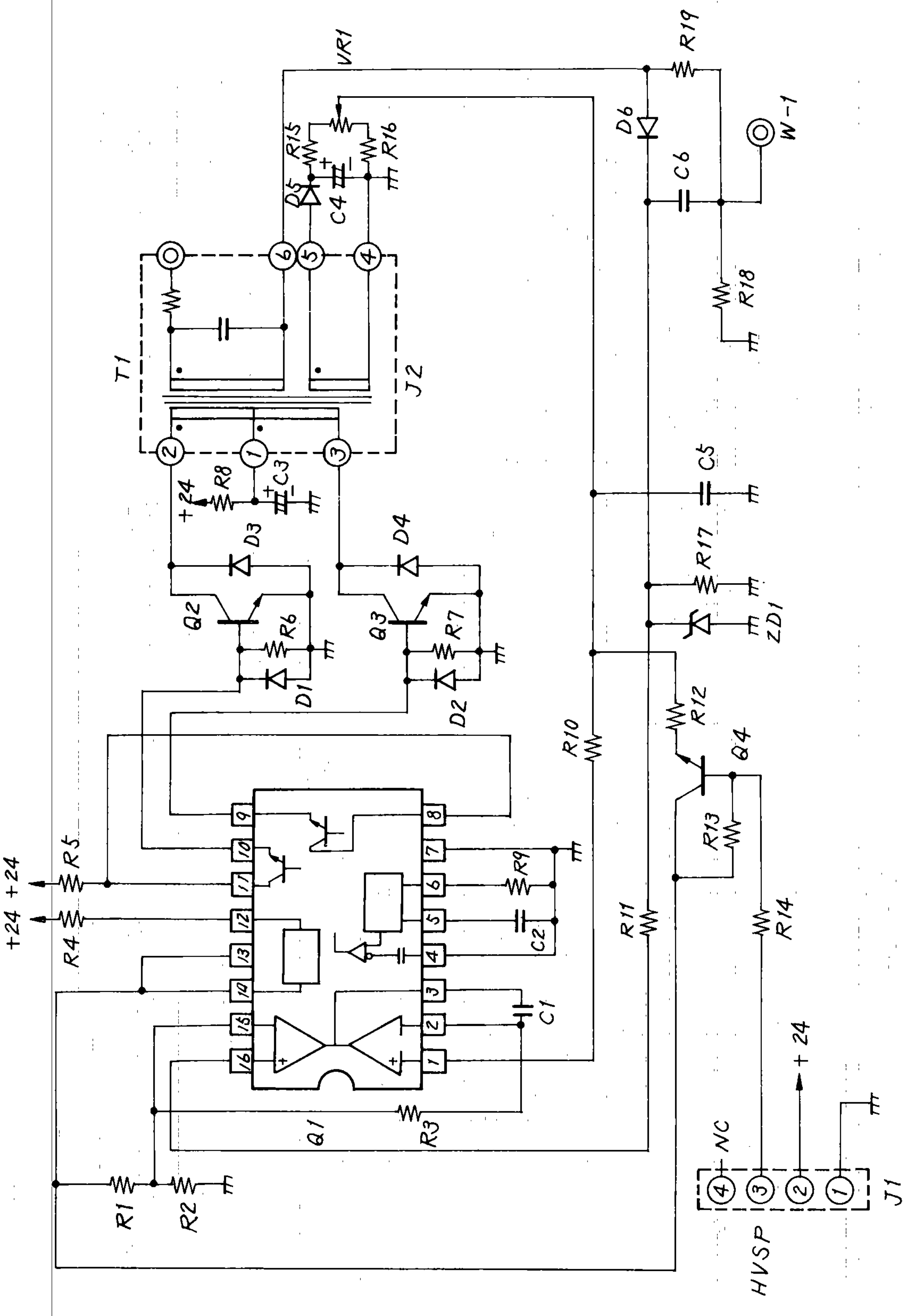
J. HVT-DC3 CIRCUIT DIAGRAM


+24V
R4
R5
R6
Q1-2
R7
VR2
C1
R27
+24V
R1
R2
Q1-1
+24V
R8
R3
VR1
C2
R11
+24V
R14
Q5
R19
Q6
R15
R16
D1
R17
Q7
R18
R20
C6
R21
T1
R23
R22
C7
R24
R25
R26
W 1
+24V
R46
C4
J1
D10
C10
R51
C9
D11
T3
D9
C12
R52
R36
R31
C13
+24V
R9
R10
R12
Q4
C5
R13
J2
HVBAC
+24V
R63
R64
Q9
R65
R62
Q8
R32
C23
+24V
ZD1
R53
D3
C14
T2
D5
R43
D4
C17
R37
Q10
C22
R44
R45
Q12
D12
R55
C24
R54
R56
Q2-2
NJM
R57
C25
+24V
R58
R59
R60
+24V
C27
C3
GND
R33
R34
+24V
R28
R29
+24V
Q2-1
C26
C18
R35
D6
D7
+24V
R42
Q11
D8
C21
C19
HVBDC
R39
R30
R40
C20

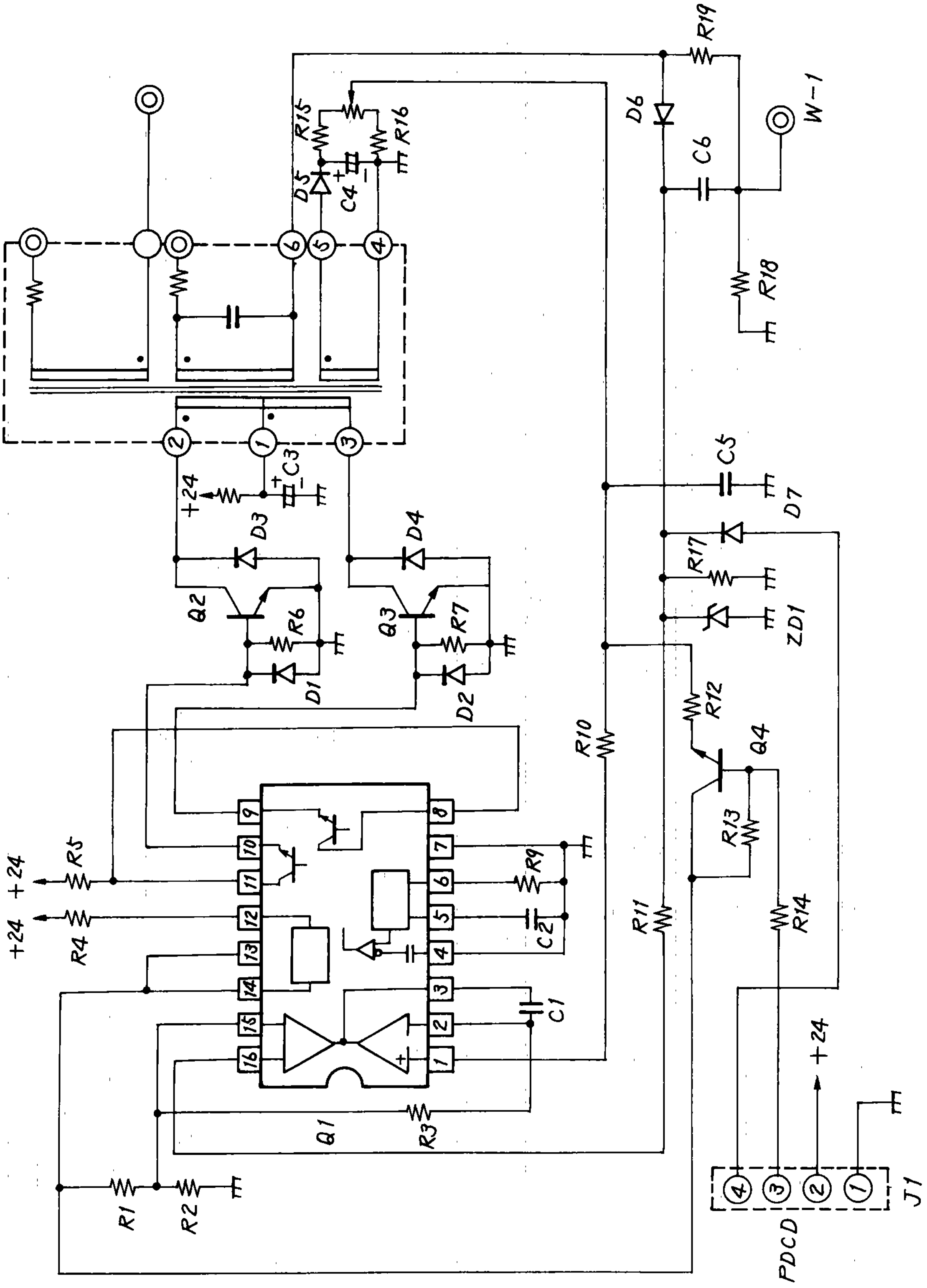
K. HVT-DC4 CIRCUIT DIAGRAM


W 4
C22
+24
R39
R40
R38
R9
R10
+24
R12
R8
D1
C6
T1
D3
R18
J2 (W1)
2
Q1
Q3
R42
R14
R15
R16
C8
C21
C7
R37
D2
R11
R13
R17
+24
C1
R1
R7
C4
R5
R2
C5
ZD1
D10
J1
R3
C3
R6
HVGB
PDDC
+24V
C2
R4
+24
R19
R33
D4
C12
T2
C15
C16
J3 (W2)
6-DC
Q4
D7
D6
D8
D9
R26
R27
R29
D12
C13
D5
C17
C18
R34
R28
+24
+24
R41
+24
R30
R31
C14
R32
ZD2
+24
Q2
C9
R20
R21
C11
R25
R24
R22
C10
R23
C20
R35

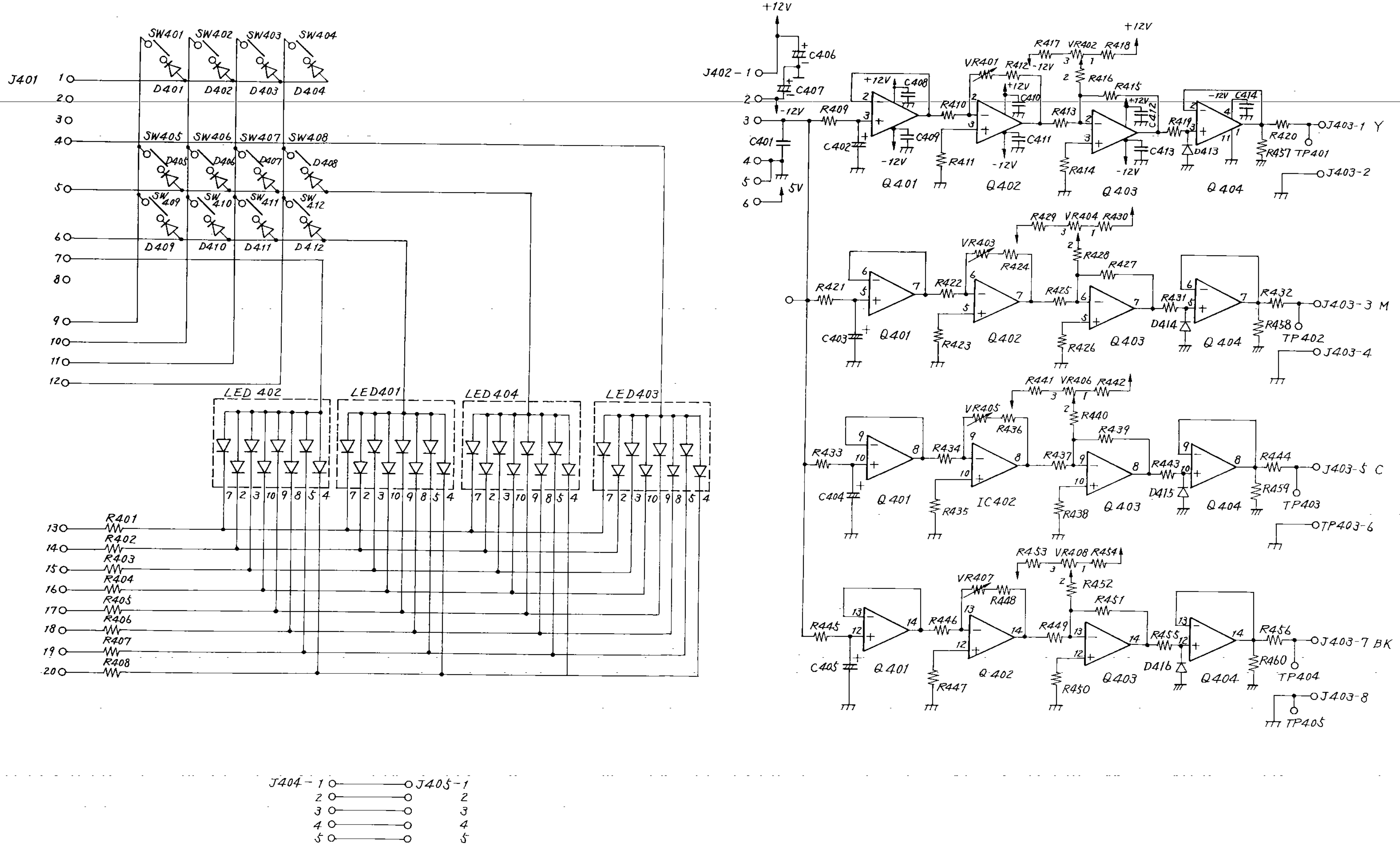
L. HVT-AC1 CIRCUIT DIAGRAM


VR1
R19
D6
W-1
C6
R15
R16
D5
C4
T1
J2
R18
C5
+24
R8
C3
D3
D4
Q2
Q3
R6
R7
R17
ZD1
D1
D2
R10
R12
Q4
R13
+24
R5
+24
R4
R9
C2
R11
R14
C1
Q1
R3
R1
R2
NC
+24
HVSP
J1

M. HVT-AC2 CIRCUIT DIAGRAM


T1
R1
R2
R3
R4
R5
R6
R7
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
C1
C2
C3
C4
C5
C6
D1
D2
D3
D4
D5
D6
D7
ZD1
Q1
Q2
Q3
Q4
+24
+24
+24
+24
W-1
J1
PDCD
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

N. DISPALY CIRCUIT DIAGRAM


J401
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
SW401
SW402
SW403
SW404
SW405
SW406
SW407
SW408
SW409
SW410
SW411
SW412
D401
D402
D403
D404
D405
D406
D407
D408
D409
D410
D411
D412
LED 402
LED401
LED404
LED403
7 2 3 10 9 8 5 4
R401
R402
R403
R404
R405
R406
R407
R408
J404 - 1
2
3
4
5
J405 - 1
2
3
4
5
+12V
J402 - 1
C406
C407
-12V
R409
C401
C402
5V
+12V
C408
C409
Q401
R410
VR401
R412
R411
C410
C411
Q402
R413
R417
VR402
R418
R416
R415
C412
R414
C413
Q403
R419
D413
-12V
C414
Q404
R420
R457
TP401
J403-1 Y
J403-2
R421
C403
R422
VR403
R424
R423
R429
VR404
R430
R428
R427
R425
R426
R431
D414
R432
R458
TP402
J403-3 M
J403-4
R433
C404
R434
VR405
R436
R435
IC402
R441
VR406
R442
R440
R439
R437
R438
R443
D415
R444
R459
TP403
J403-5 C
TP403-6
R445
C405
R446
VR407
R448
R447
R453
VR408
R454
R452
R451
R449
R450
R455
D416
R456
R460
TP404
J403-7 BK
J403-8
TP405

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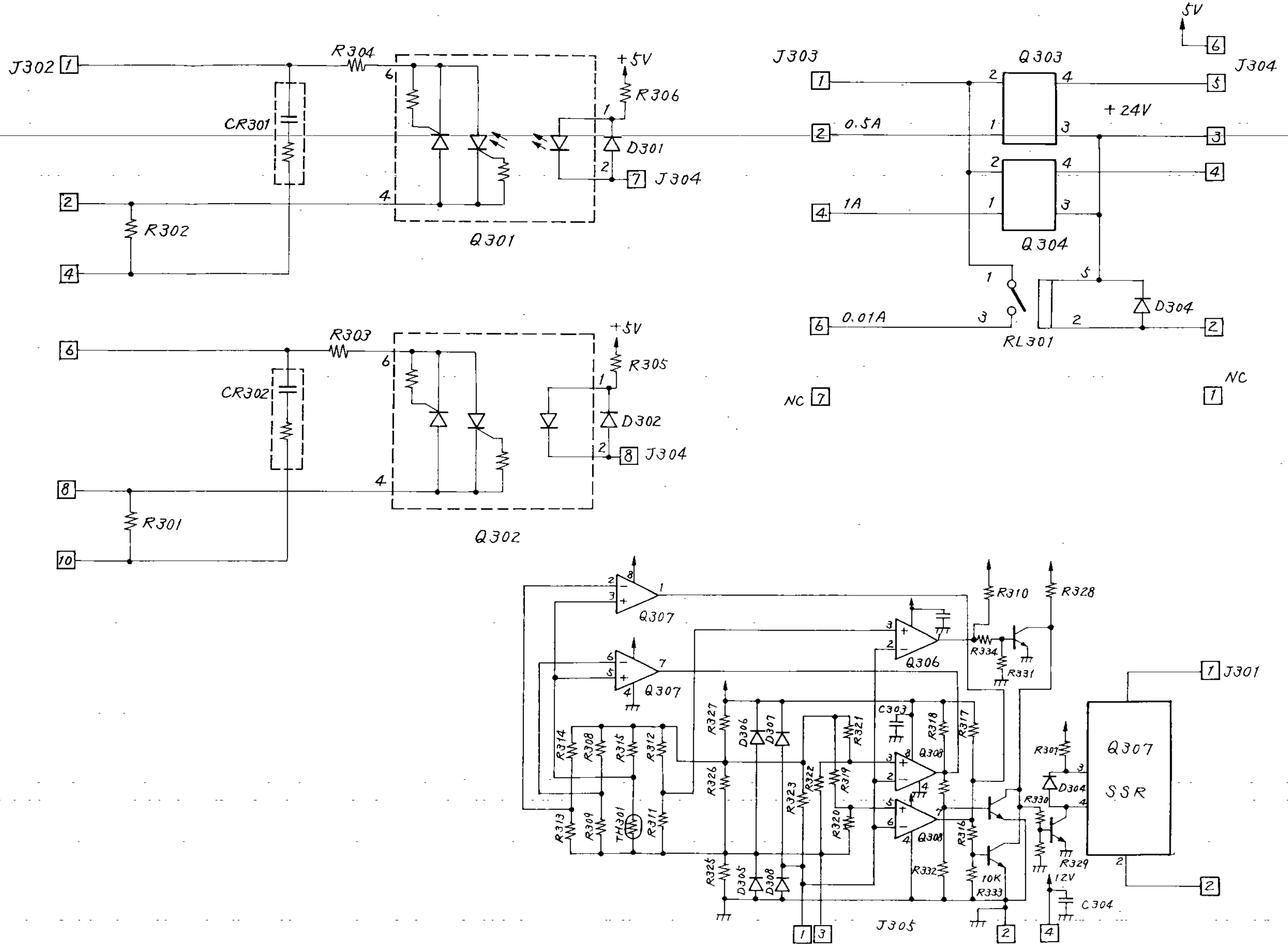
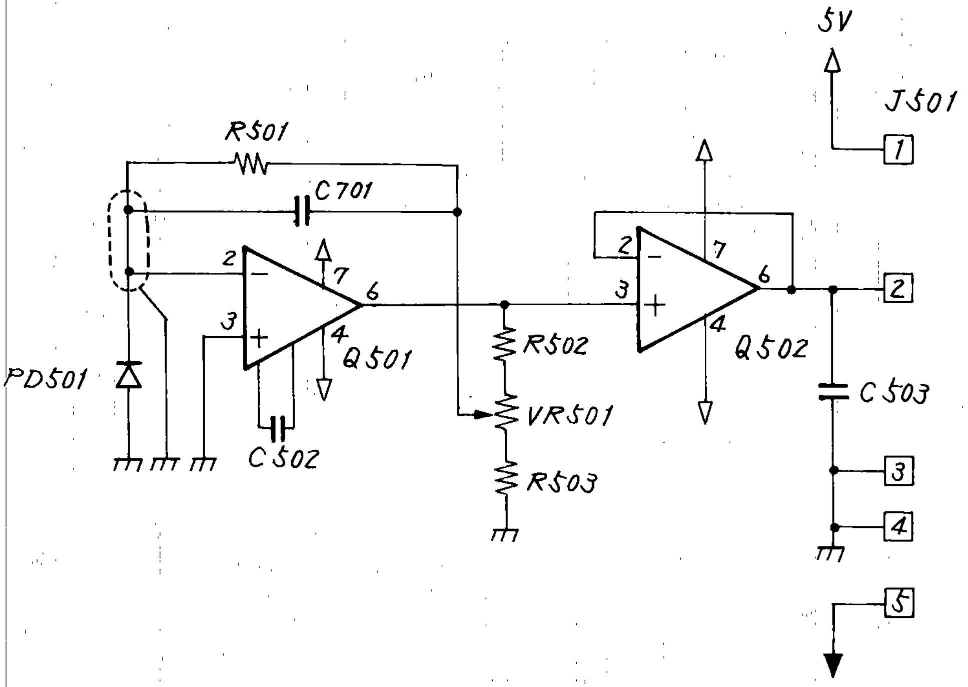
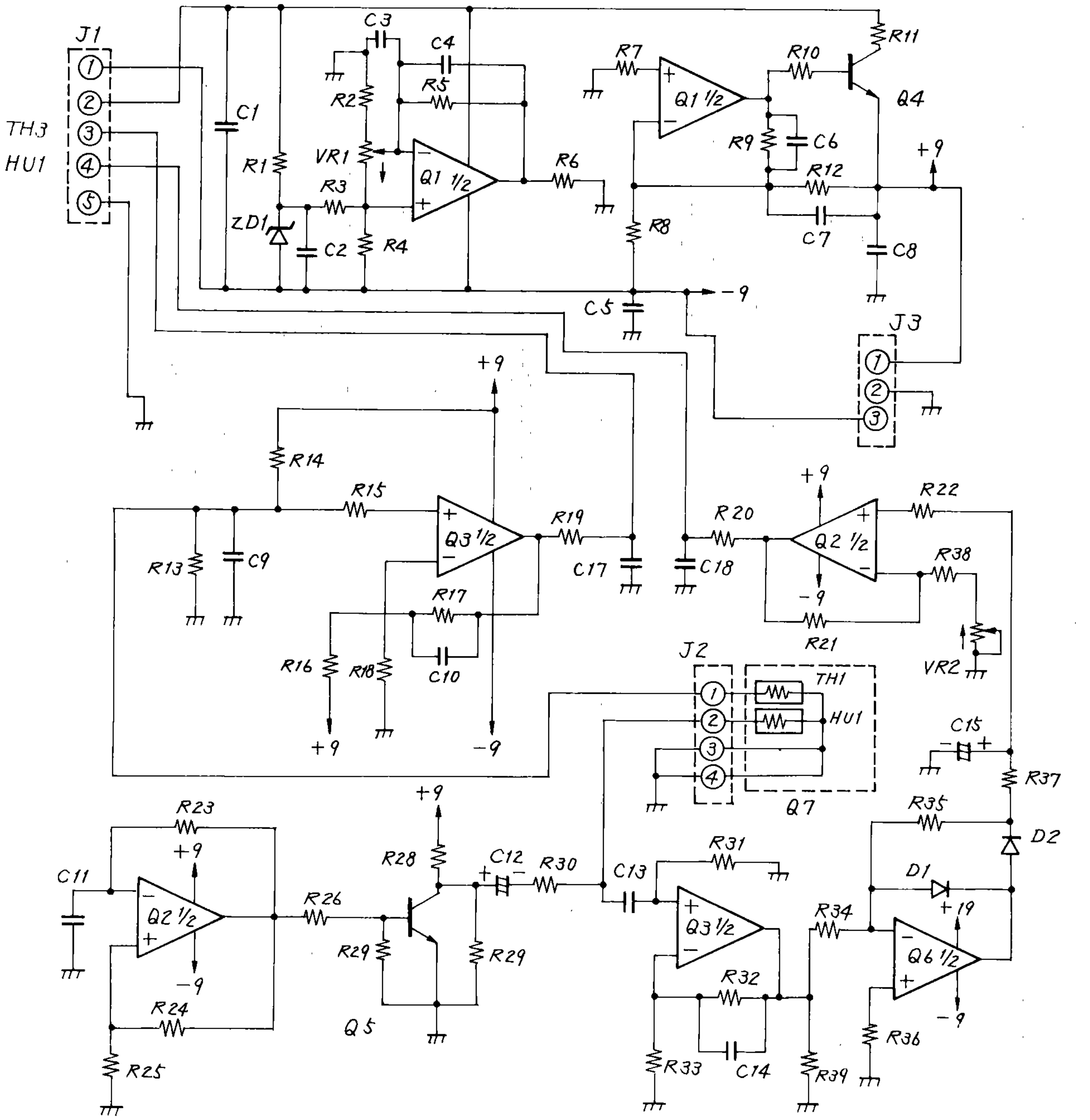
O. AC DRIVER CIRCUIT DIAGRAM


J302
R304
CR301
+5V
R306
D301
Q301
J304
R302
R303
CR302
R305
D302
Q302
R301
J303
Q303
Q304
0.5A
1A
0.01A
+24V
5V
D304
RL301
NC
Q307
Q306
Q308
R310
R328
R334
R331
C303
D306
D307
D305
D308
R327
R326
R325
R314
R308
R315
R312
R313
R309
TH301
R311
R323
R322
R319
R320
R321
R318
R317
R316
R332
R333
10K
R307
R330
R329
12V
C304
J301
SSR
J305

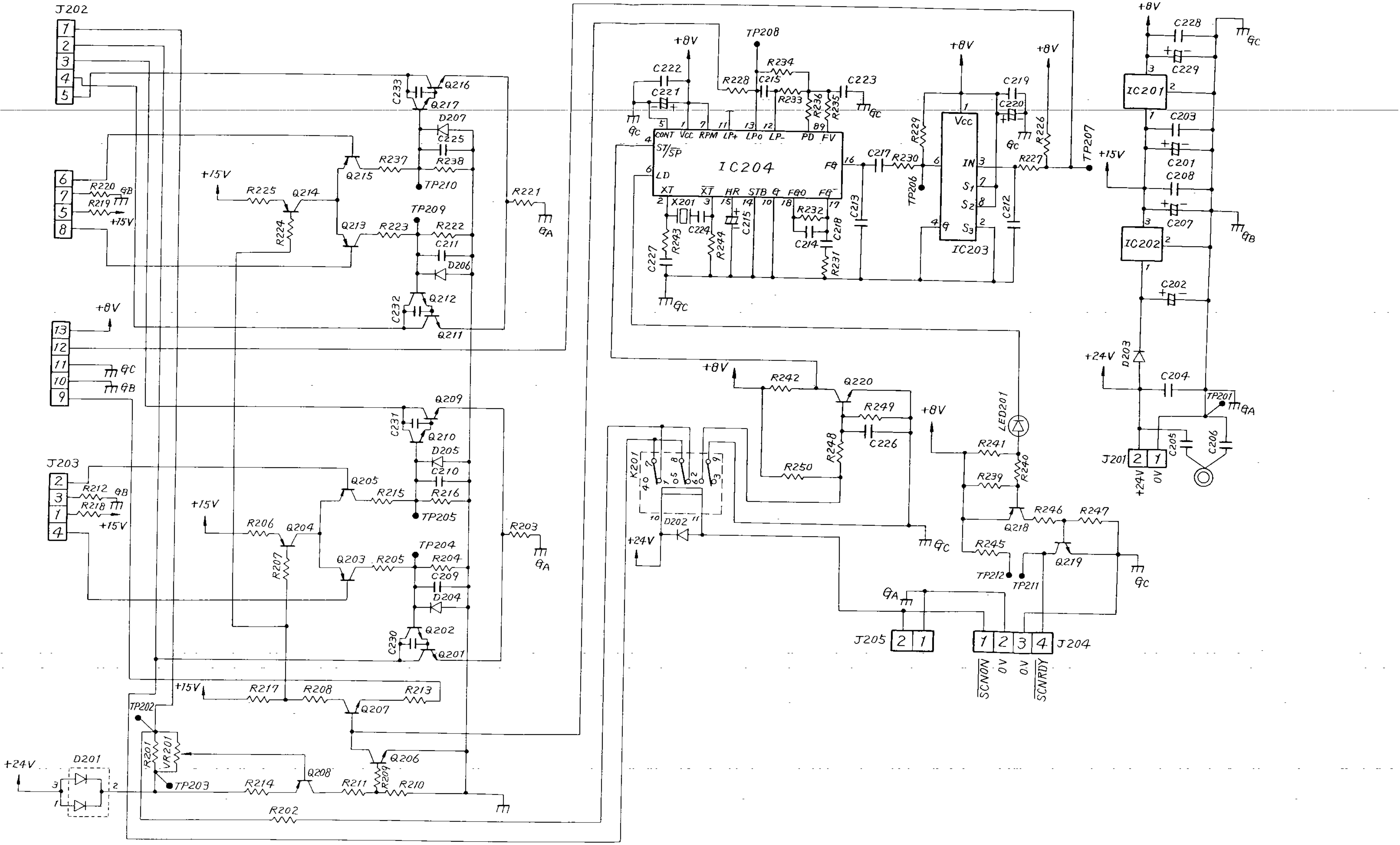
P. TONER CONCENTRATION SENSOR CIRCUIT DIAGRAM

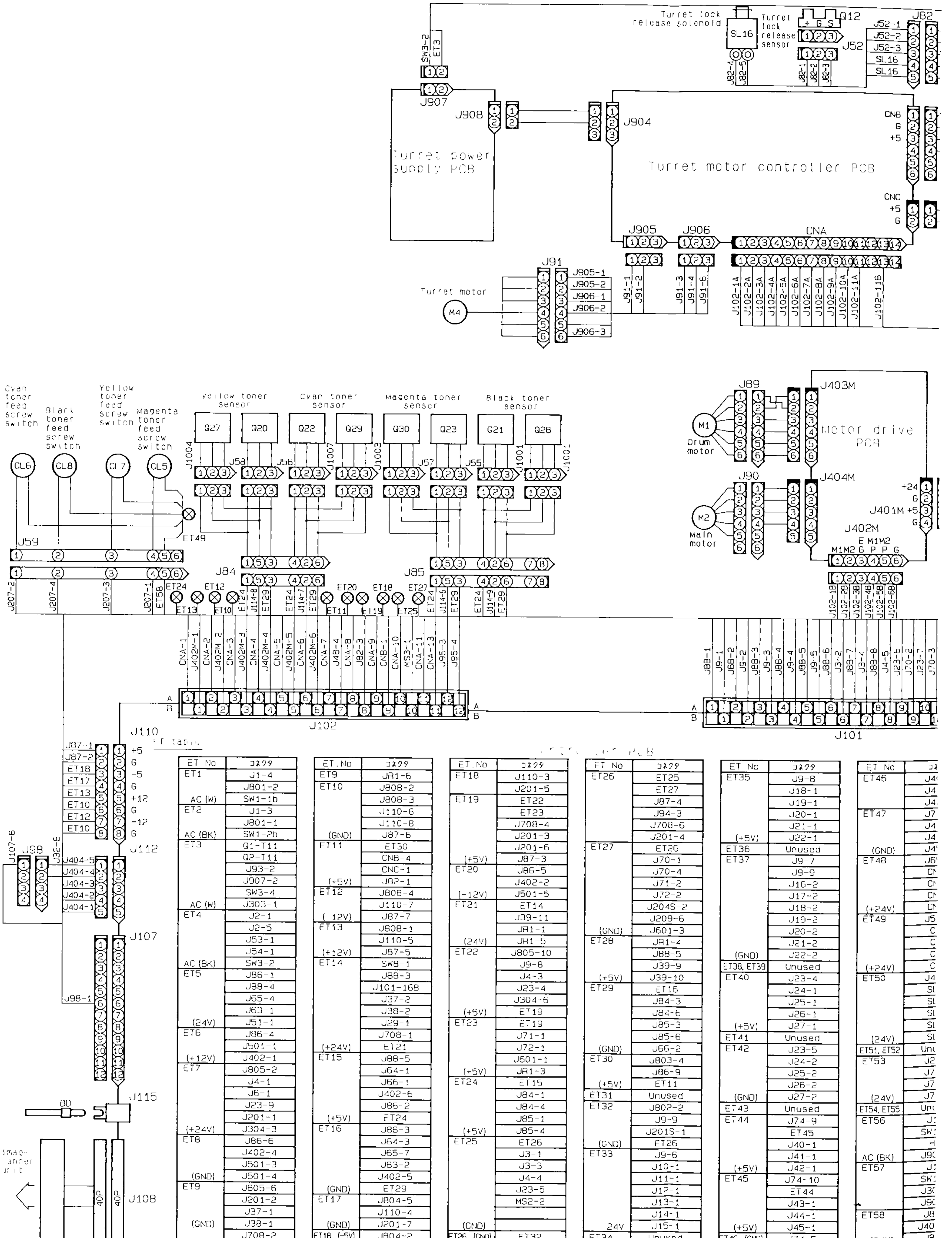

5V
J501
1
R501
C701
2
7
6
3
4
Q501
PD501
C502
R502
VR501
R503
2
7
6
3
4
Q502
2
C503
3
4
5

Q. ENVIRONMENT MEASUREMENT CIRCUIT DIAGRAM


J1
TH3
HU1
C1
R1
ZD1
C2
R2
R3
R4
C3
C4
R5
VR1
Q1 1/2
R6
R7
Q1 1/2
R8
C5
R9
C6
R10
R11
Q4
R12
C7
C8
+9
-9
J3
+9
R14
R13
C9
R15
Q3 1/2
R19
C17
R16
R17
R18
C10
R20
C18
Q2 1/2
R22
R38
R21
VR2
J2
TH1
HU1
Q7
C15
R37
D2
R23
C11
Q2 1/2
R24
R25
R26
R28
R29
Q5
C12
R30
C13
R31
Q3 1/2
R32
R33
C14
R34
R35
D1
Q6 1/2
R36
R39
+19

R. SCANNING MIRROR MOTOR DRIVER CIRCUIT DIAGRAM


J202
J203
J201
J204
J205
IC201
IC202
IC203
IC204
CONT
Vcc
RPM
LP+
LPo
LP-
PD
FV
ST/SP
LD
XT
HR
STB
FGO
FG
IN
S1
S2
S3
K201
D201
D202
D203
D204
D205
D206
D207
LED201
X201
VR201
Q201
Q202
Q203
Q204
Q205
Q206
Q207
Q208
Q209
Q210
Q211
Q212
Q213
Q214
Q215
Q216
Q217
Q218
Q219
Q220
TP201
TP202
TP203
TP204
TP205
TP206
TP207
TP208
TP209
TP210
TP211
TP212
+8V
+15V
+24V
0V
ϑA
ϑB
ϑC
SCNON
SCNRDY


Turret lock release solenoid
SL16
Turret lock release sensor
Q12
+ G S
J52
J52-1
J52-2
J52-3
SL16
SL16
J82
J82-4
J82-5
J82-1
J82-2
J82-3
SW3-2
ET3
J907
J908
J904
Turret power supply PCB
Turret motor controller PCB
CNB
G
+5
CNC
+5
G
J905
J906
CNA
J91
J905-1
J905-2
J906-1
J906-2
J906-3
J91-1
J91-2
J91-3
J91-4
J91-6
J102-1A
J102-2A
J102-3A
J102-4A
J102-5A
J102-6A
J102-7A
J102-8A
J102-9A
J102-10A
J102-11A
J102-11B
Turret motor
M4
Cyan toner feed screw switch
Black toner feed screw switch
Yellow toner feed screw switch
Magenta toner feed screw switch
CL6
CL8
CL7
CL5
Yellow toner sensor
Cyan toner sensor
Magenta toner sensor
Black toner sensor
Q27
Q20
Q22
Q29
Q30
Q23
Q21
Q28
J1004
J58
J56
J1007
J1003
J57
J55
J1001
J1001
ET49
J59
J84
J85
J207-2
J207-4
J207-3
J207-1
ET58
ET24
ET12
ET13
ET10
ET24
J114-8
ET29
ET24
J114-7
ET29
ET20
ET18
ET27
ET11
ET19
ET25
ET24
J114-6
ET29
ET24
J114-9
ET29
CNA-1
J402M-1
CNA-2
J402M-2
CNA-3
J402M-3
CNA-4
J402M-4
CNA-5
J402M-5
CNA-6
J402M-6
CNA-7
J48-4
CNA-8
J82-3
CNA-9
CNB-1
CNA-10
MS3-1
CNA-11
CNA-13
J96-3
J96-4
A
B
J102
J89
J403M
M1
Drum motor
Motor drive PCB
J90
J404M
M2
Main motor
+24
G
J401M
+5
G
J402M
E M1M2
M1M2 G P P G
J102-1B
J102-2B
J102-3B
J102-4B
J102-5B
J102-6B
J88-1
J9-1
J88-2
J9-2
J88-3
J9-3
J88-4
J9-4
J88-5
J9-5
J88-6
J3-2
J88-7
J3-4
J88-8
J4-5
J23-6
J70-2
J23-7
J70-3
J101
J110
J87-1
J87-2
ET18
ET17
ET13
ET10
ET12
ET10
+5
G
-5
G
+12
G
-12
G
J107-6
J98
J32-8
J404-5
J404-4
J404-3
J404-2
J404-1
J112
J107
J98-1
J115
BD
J108
40P
40P
Image scanner unit

T table

ET No	コネクタ
ET1	J1-4
	J801-2
AC (W)	SW1-1b
ET2	J1-3
	J801-1
AC (BK)	SW1-2b
ET3	Q1-T11
	Q2-T11
	J93-2
	J907-2
	SW3-4
AC (W)	J303-1
ET4	J2-1
	J2-5
	J53-1
	J54-1
AC (BK)	SW3-2
ET5	J86-1
	J88-4
	J65-4
	J63-1
(24V)	J51-1
ET6	J86-4
	J501-1
(+12V)	J402-1
ET7	J805-2
	J4-1
	J6-1
	J23-9
	J201-1
(+24V)	J304-3
ET8	J86-6
	J402-4
	J501-3
(GND)	J501-4
ET9	J805-6
	J201-2
	J37-1
(GND)	J38-1
	J708-2

ET.No	コネクタ
ET9	JR1-6
ET10	J808-2
	J808-3
	J110-6
	J110-8
(GND)	J87-6
ET11	ET30
	CNB-4
	CNC-1
(+5V)	J82-1
ET12	J808-4
	J110-7
(-12V)	J87-7
ET13	J808-1
	J110-5
(+12V)	J87-5
ET14	SW8-1
	J88-3
	J101-16B
	J37-2
	J38-2
	J29-1
	J708-1
(+24V)	ET21
ET15	J88-5
	J64-1
	J66-1
	J402-6
	J86-2
(+5V)	ET24
ET16	J86-3
	J64-3
	J65-7
	J83-2
	J402-5
(GND)	ET29
ET17	J804-5
	J110-4
(GND)	J201-7
ET18 (-5V)	J804-2

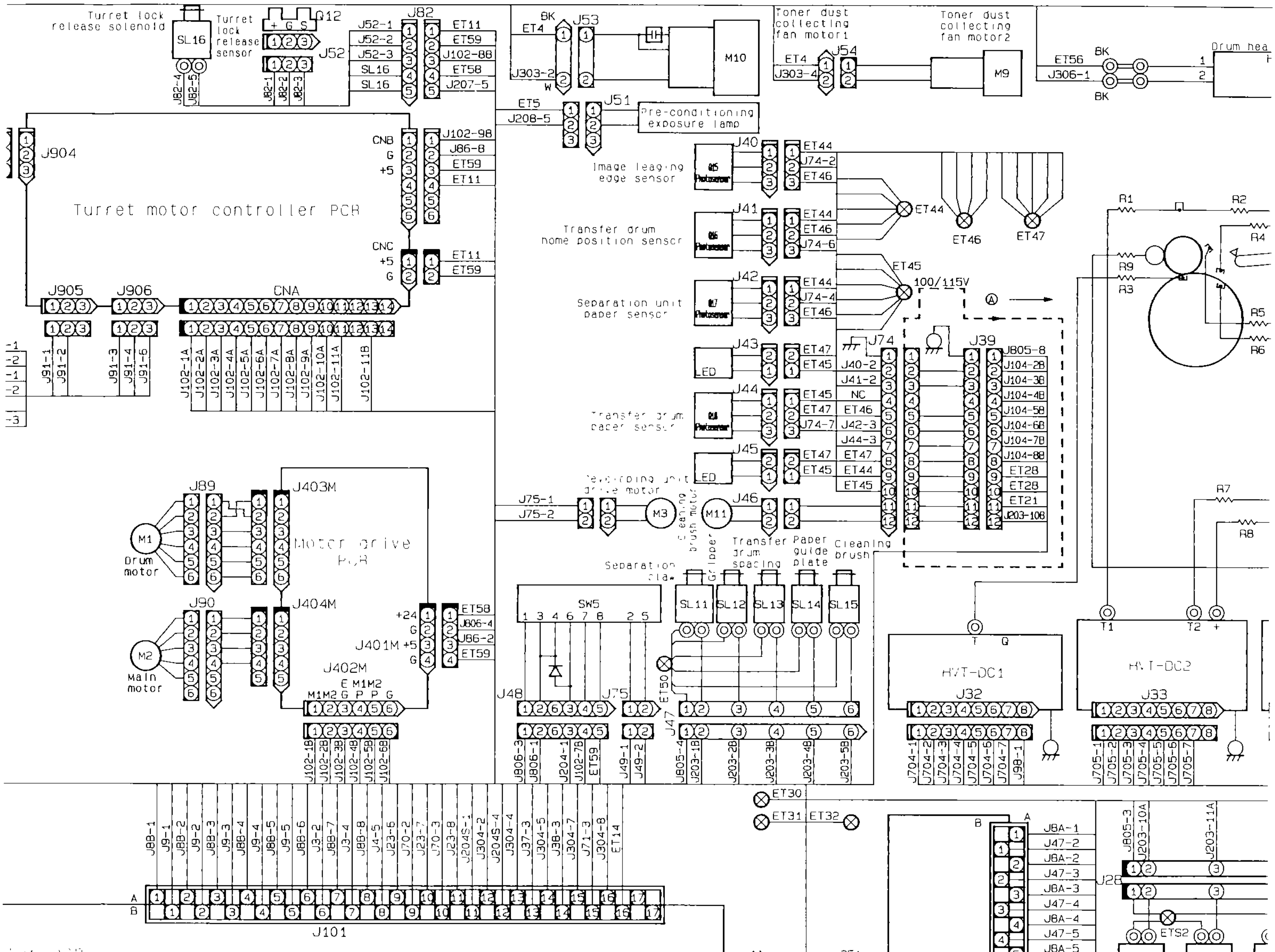
PCB

ET.No	コネクタ
ET18	J110-3
	J201-5
ET19	ET22
	ET23
	J708-4
	J201-3
	J201-6
(+5V)	J87-3
ET20	J86-5
	J402-2
(-12V)	J501-5
ET21	ET14
	J39-11
	JR1-1
(24V)	JR1-5
ET22	J805-10
	J9-8
	J4-3
	J23-4
	J304-6
(+5V)	ET19
ET23	ET19
	J71-1
	J72-1
	J601-1
(+5V)	JR1-3
ET24	ET15
	J84-1
	J84-4
	J85-1
(+5V)	J85-4
ET25	ET26
	J3-1
	J3-3
	J4-4
	J23-5
	MS2-2
(GND)	
ET26 (GND)	ET32

ET No	コネクタ
ET26	ET25
	ET27
	J87-4
	J94-3
	J708-6
	J201-4
ET27	ET26
	J70-1
	J70-4
	J71-2
	J72-2
	J204S-2
	J209-6
(GND)	J601-3
ET28	JR1-4
	J88-5
	J39-9
(+5V)	J39-10
ET29	ET16
	J84-3
	J84-6
	J85-3
	J85-6
(GND)	J66-2
ET30	J803-4
	J86-9
(+5V)	ET11
ET31	Unused
ET32	J802-2
	J9-9
	J201S-1
(GND)	ET26
ET33	J9-6
	J10-1
	J11-1
	J12-1
	J13-1
	J14-1
24V	J15-1
ET34	Unused

ET No	コネクタ
ET35	J9-8
	J18-1
	J19-1
	J20-1
	J21-1
(+5V)	J22-1
ET36	Unused
ET37	J9-7
	J9-9
	J16-2
	J17-2
	J18-2
	J19-2
	J20-2
	J21-2
(GND)	J22-2
ET38, ET39	Unused
ET40	J23-4
	J24-1
	J25-1
	J26-1
(+5V)	J27-1
ET41	Unused
ET42	J23-5
	J24-2
	J25-2
	J26-2
(GND)	J27-2
ET43	Unused
ET44	J74-9
	ET45
	J40-1
	J41-1
(+5V)	J42-1
ET45	J74-10
	ET44
	J43-1
	J44-1
(+5V)	J45-1
ET46 (GND)	J74-5

ET No	コネ
ET46	J4
	J4
	J4
ET47	J7
	J4
	J4
(GND)	J4
ET48	J6
	CN
	CN
	CN
(+24V)	CN
ET49	J5
	C
	C
	C
(+24V)	C
ET50	J4
	SL
	SL
	SL
	SL
(24V)	SL
ET51, ET52	Un
ET53	J2
	J7
	J7
(24V)	J7
ET54, ET55	Un
ET56	J
	SW
	H
AC (BK)	J9
ET57	J
	SW
	J3
	J9
ET58	J8
	J40
	J8

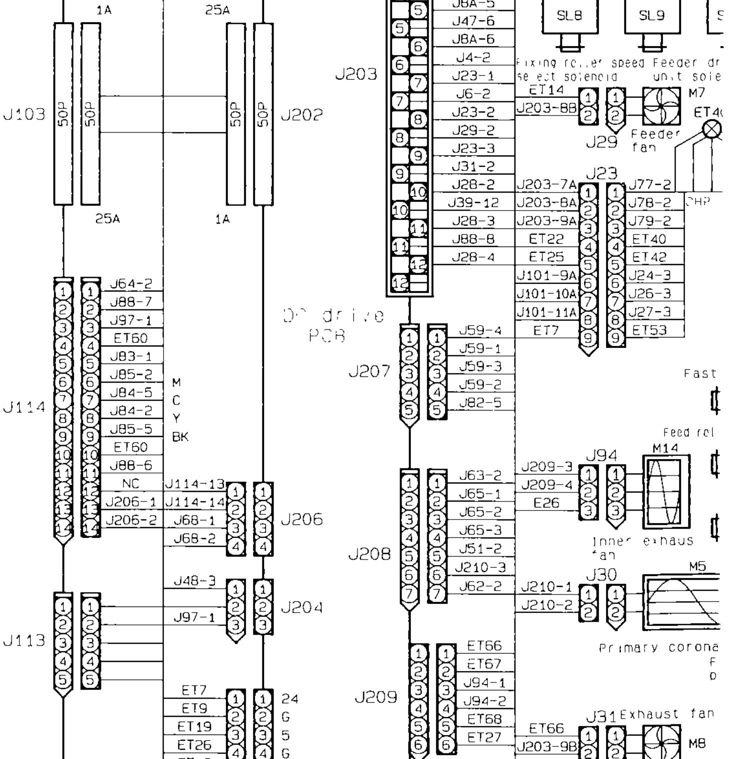

Turret lock release solenoid
SL16
Turret lock release sensor
Q12
J52
J82
Toner dust collecting fan motor1
M10
Toner dust collecting fan motor2
M9
J53
J54
Drum hea
J51
Pre-conditioning exposure lamp
J904
Turret motor controller PCB
CNB
CNC
CNA
J905
J906
Image leading edge sensor
Transfer drum home position sensor
Separation unit paper sensor
Transfer drum paper sensor
LED
J40
J41
J42
J43
J44
J45
J46
J74
J39
ET44
ET45
ET46
ET47
100/115V
Ⓐ
R1
R2
R3
R4
R5
R6
R7
R8
R9
J89
J403M
M1
Drum motor
Motor drive PCB
J90
J404M
M2
Main motor
J401M
J402M
Developing unit drive motor
M3
M11
Cleaning brush motor
Gripper
Transfer drum spacing
Paper guide plate
Cleaning brush
Separation claw
SW5
SL11
SL12
SL13
SL14
SL15
ET50
J48
J75
J47
HVT-DC1
HVT-DC2
J32
J33
T
Q
T1
T2
J101
A
B

ET No	コネクタ
ET26	ET25
	ET27
	J87-4
	J94-3
	J708-6
	J201-4
ET27	ET26
	J70-1
	J70-4
	J71-2
	J72-2
	J204S-2
	J209-6
(GND)	J601-3
ET28	JR1-4
	J88-5
	J39-9
(+5V)	J39-10
ET29	ET16
	J84-3
	J84-6
	J85-3
	J85-6
(GND)	J66-2
ET30	J803-4
	J86-9
(+5V)	ET11
ET31	Unused
ET32	J802-2
	J9-9
	J201S-1
(GND)	ET26
ET33	J9-6
	J10-1
	J11-1
	J12-1
	J13-1
	J14-1
24V	J15-1

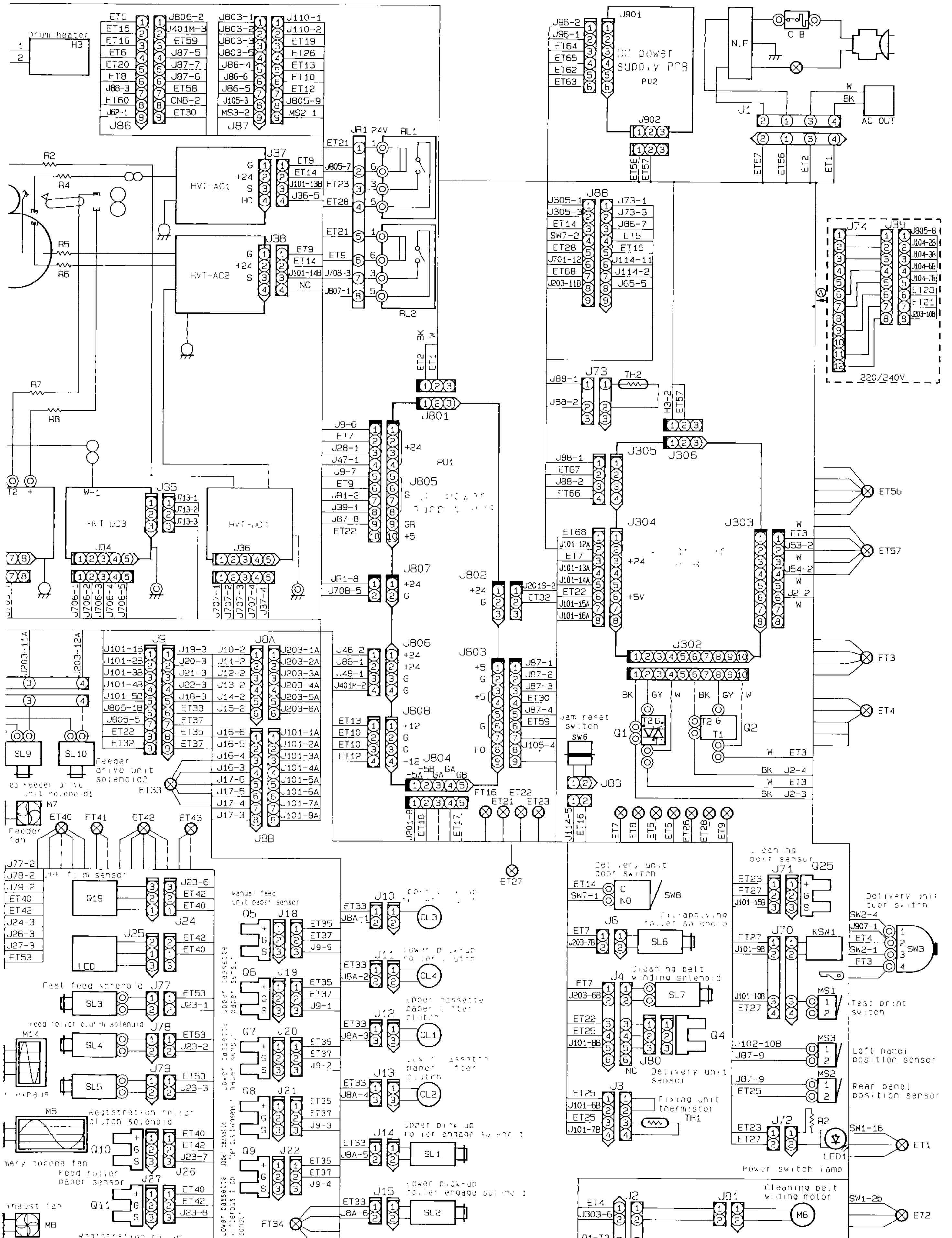
ET.No	コネクタ
ET35	J9-8
	J18-1
	J19-1
	J20-1
	J21-1
(+5V)	J22-1
ET36	Unused
ET37	J9-7
	J9-9
	J16-2
	J17-2
	J18-2
	J19-2
	J20-2
	J21-2
(GND)	J22-2
ET38, ET39	Unused
ET40	J23-4
	J24-1
	J25-1
	J26-1
(+5V)	J27-1
ET41	Unused
ET42	J23-5
	J24-2
	J25-2
	J26-2
(GND)	J27-2
ET43	Unused
ET44	J74-9
	ET45
	J40-1
	J41-1
(+5V)	J42-1
ET45	J74-10
	ET44
	J43-1
	J44-1
(+5V)	J45-1

ET.No	コネクタ
ET46	J40-3
	J41-3
	J42-2
ET47	J74-8
	J43-2
	J44-2
(GND)	J45-2
ET48	J65-4
	CNT1
	CNT2
	CNT3
(+24V)	CNT4
ET49	J59-5
	CL5
	CL6
	CL7
(+24V)	CL8
ET50	J47-1
	SL11
	SL12
	SL13
	SL14
(24V)	SL15
ET51, ET52	Unused
ET53	J23-9
	J77-1
	J78-1
(24V)	J79-1
ET54, ET55	Unused
ET56	J1-1
	SW1-2a
	H-3
AC (BK)	J901-1
ET57	J1-2
	SW1-1a
	J306-2
	J902-2
ET58	J86-7
	J401M-1

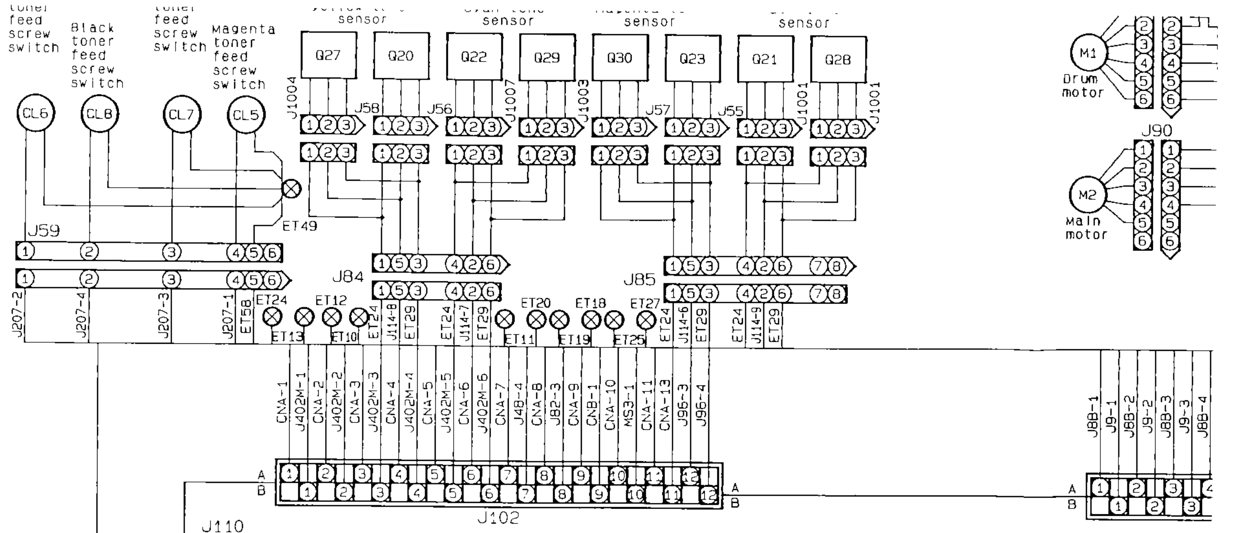
ET No	コネクタ
ET58	J59-5
ET59	J803-6
	J401M-4
	CNB-3
	CNC-2
	J82-2
	J48-5
	J86-3
(GND)	J96-5
ET60	J66-3
	J86-8
	J114-10
	J114-4
ET61	Unused
ET62	J901-5
	J95-1
(+5V)	J105-1
ET63	J901-6
	J95-2
(GND)	J105-6
ET64	J901-3
	J95-3
(+12V)	J105-5
ET65	J901-4
	J95-4
(GND)	J105-2
ET66	J95-3
	J31-3
	J209-1
(+12V)	J305-4
ET67	J95-4
	J209-2
(GND)	J305-2
ET68	J88-7
	J209-5
	J304-1

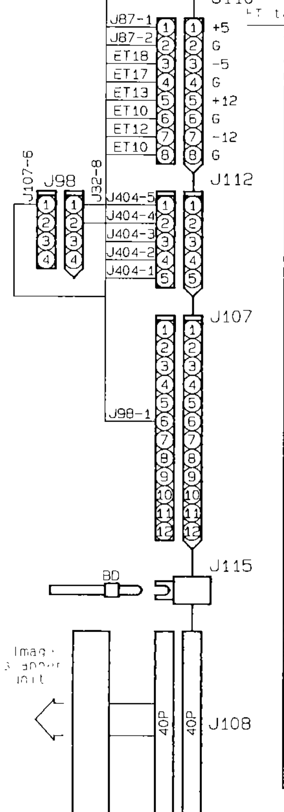

J103
50P
1A
25A
J202
J203
DC drive PCB
J114
M
C
Y
BK
J113
J206
J204
J207
J208
J209
J28
SL8
SL9
ETS2
Fixing roller speed select solenoid
Feeder drive unit solenoid
M7
Feeder fan
J29
J23
J94
M14
Feed rol
Inner exhaust fan
J30
M5
Primary corona
J31
Exhaust fan
M8
Fast

R-1. GENERAL WIRING DIAGRAM



Drum heater
H3
HVT-AC1
HVT-AC2
J37
J38
J86
J87
JR1 24V
RL1
RL2
J901
DC power supply PCB
PU2
J902
N.F
C B
J1
AC OUT
J88
J74
J39
220/240V
J73
TH2
J801
PU1
J805
J807
J802
J806
J803
J808
J804
J305
J306
J304
J303
J302
Q1
Q2
ET56
ET57
ET3
ET4
J35
J34
J36
HVT-DC3
HVT-DC1
J9
J8A
J8B
SL9
SL10
Feeder drive unit solenoid2
ET33
M7
Feeder fan
ET40
ET41
ET42
ET43
Jam reset switch
SW6
J83
ET16
ET21
ET22
ET23
ET27
Q19
J24
J25
LED
Fast feed solenoid
J77
SL3
Feed roller clutch solenoid
J78
SL4
M14
J79
SL5
M5
Registration roller clutch solenoid
Q10
J26
Primary corona fan
Feed roller paper sensor
J27
Q11
Exhaust fan
M8
Manual feed unit paper sensor
Q5
J18
Q6
J19
Q7
J20
Q8
J21
Q9
J22
FT34
J10
CL3
J11
Lower pick-up roller clutch
CL4
J12
Upper cassette paper lifter clutch
CL1
J13
Lower cassette paper lifter clutch
CL2
J14
Upper pick-up roller engage solenoid
SL1
J15
Lower pick-up roller engage solenoid
SL2
Delivery unit door switch
SW8
J6
Oil-applying roller solenoid
SL6
Cleaning belt winding solenoid
J4
SL7
Q4
J80
Delivery unit sensor
J3
Fixing unit thermistor
TH1
Cleaning belt sensor
J71
Q25
J70
KSW1
Delivery unit door switch
SW3
MS1
Test print switch
MS3
Left panel position sensor
MS2
Rear panel position sensor
J72
R2
LED1
Power switch lamp
ET1
J2
J81
Cleaning belt winding motor
M6
ET2


toner feed screw switch
Black toner feed screw switch
toner feed screw switch
Magenta toner feed screw switch
CL6
CL8
CL7
CL5
sensor
sensor
sensor
sensor
Q27
Q20
Q22
Q29
Q30
Q23
Q21
Q28
J1004
J58
J56
J1007
J1003
J57
J55
J1001
J1001
ET49
J59
J84
J85
J207-2
J207-4
J207-3
J207-1
ET58
ET24
ET12
ET13
ET10
ET20
ET18
ET27
ET11
ET19
ET25
ET24
J114-8
ET29
J114-7
ET29
J114-6
ET29
J114-9
ET29
CNA-1
J402M-1
CNA-2
J402M-2
CNA-3
J402M-3
CNA-4
J402M-4
CNA-5
J402M-5
CNA-6
J402M-6
CNA-7
J48-4
CNA-8
J82-3
CNA-9
CNB-1
CNA-10
MS3-1
CNA-11
CNA-13
J96-3
J96-4
J102
A
B
M1
Drum motor
J90
M2
Main motor
J88-1
J9-1
J88-2
J9-2
J88-3
J9-3
J88-4


J110
+5
G
-5
G
+12
G
-12
G
J87-1
J87-2
ET18
ET17
ET13
ET10
ET12
ET10
J112
J107-6
J98
J32-8
J404-5
J404-4
J404-3
J404-2
J404-1
J107
J98-1
J115
BD
Image scanner unit
40P
40P
J108

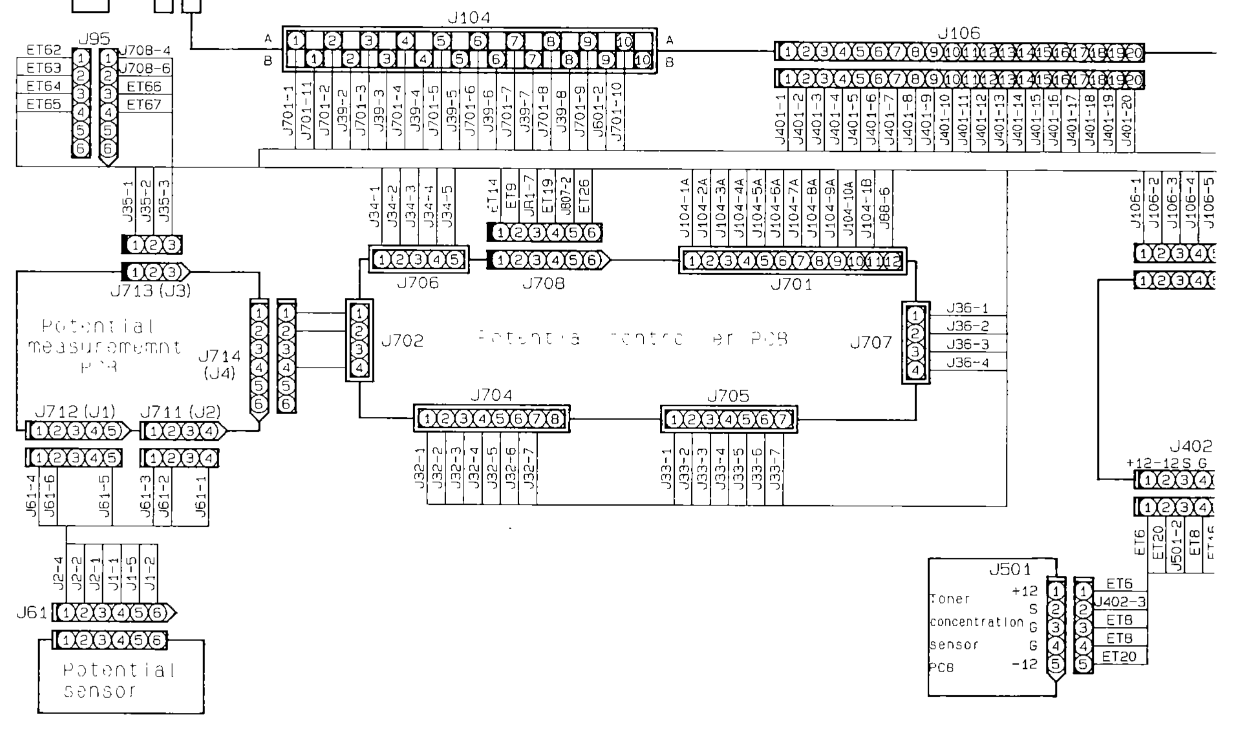
ET No	コネクタ
ET1	J1-4
	J801-2
AC (W)	SW1-1b
ET2	J1-3
	J801-1
AC (BK)	SW1-2b
ET3	Q1-T11
	Q2-T11
	J93-2
	J907-2
	SW3-4
AC (W)	J303-1
ET4	J2-1
	J2-5
	J53-1
	J54-1
AC (BK)	SW3-2
ET5	J86-1
	J88-4
	J65-4
	J63-1
(24V)	J51-1
ET6	J86-4
	J501-1
(+12V)	J402-1
ET7	J805-2
	J4-1
	J6-1
	J23-9
	J201-1
(+24V)	J304-3
ET8	J86-6
	J402-4
	J501-3
(GND)	J501-4
ET9	J805-6
	J201-2
	J37-1
(GND)	J38-1
	J708-2

ET No	コネクタ
ET9	JR1-6
ET10	J808-2
	J808-3
	J110-6
	J110-8
(GND)	J87-6
ET11	ET30
	CNB-4
	CNC-1
(+5V)	J82-1
ET12	J808-4
	J110-7
(-12V)	J87-7
ET13	J808-1
	J110-5
(+12V)	J87-5
ET14	SW8-1
	J88-3
	J101-16B
	J37-2
	J38-2
	J29-1
	J708-1
(+24V)	ET21
ET15	J88-5
	J64-1
	J66-1
	J402-6
	J86-2
(+5V)	ET24
ET16	J86-3
	J64-3
	J65-7
	J83-2
	J402-5
(GND)	ET29
ET17	J804-5
	J110-4
(GND)	J201-7
ET18 (-5V)	J804-2

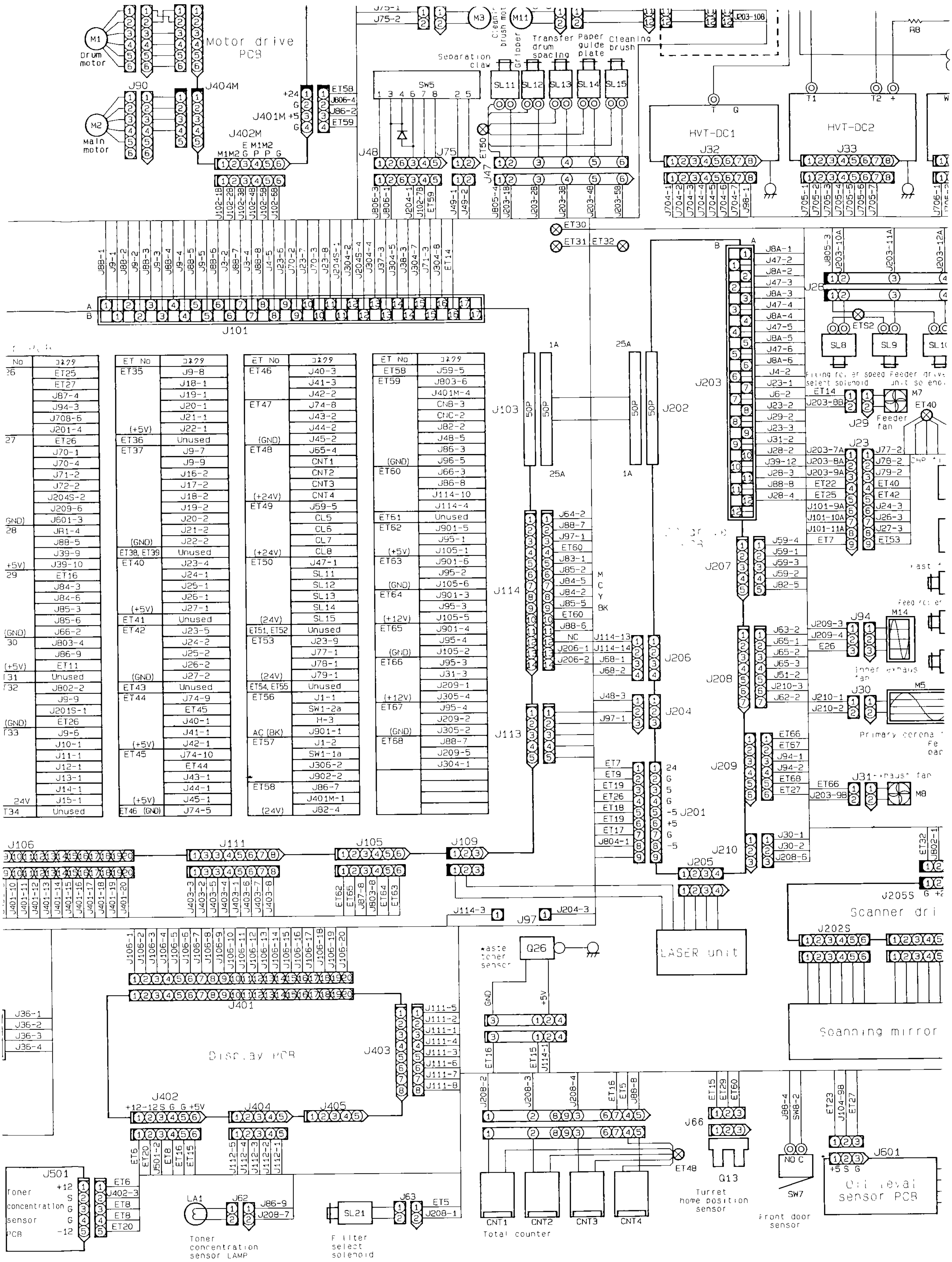
ET No	コネクタ
ET18	J110-3
	J201-5
ET19	ET22
	ET23
	J708-4
	J201-3
	J201-6
(+5V)	J87-3
ET20	J86-5
	J402-2
(-12V)	J501-5
ET21	ET14
	J39-11
	JR1-1
(24V)	JR1-5
ET22	J805-10
	J9-8
	J4-3
	J23-4
	J304-6
(+5V)	ET19
ET23	ET19
	J71-1
	J72-1
	J601-1
(+5V)	JR1-3
ET24	ET15
	J84-1
	J84-4
	J85-1
(+5V)	J85-4
ET25	ET26
	J3-1
	J3-3
	J4-4
	J23-5
	MS2-2
(GND)	
ET26 (GND)	ET32

ET No	コネクタ
ET26	ET25
	ET27
	J87-4
	J94-3
	J708-6
	J201-4
ET27	ET26
	J70-1
	J70-4
	J71-2
	J72-2
	J204S-2
	J209-6
(GND)	J601-3
ET28	JR1-4
	J88-5
	J39-9
(+5V)	J39-10
ET29	ET16
	J84-3
	J84-6
	J85-3
	J85-6
(GND)	J66-2
ET30	J803-4
	J86-9
(+5V)	ET11
ET31	Unused
ET32	J802-2
	J9-9
	J201S-1
(GND)	ET26
ET33	J9-6
	J10-1
	J11-1
	J12-1
	J13-1
	J14-1
24V	J15-1
ET34	Unused

ET.No	
ET35	
(+5V)	
ET36	
ET37	
(GND)	
ET38, ET39	
ET40	
(+5V)	
ET41	
ET42	
(GND)	
ET43	
ET44	
(+5V)	
ET45	
(+5V)	
ET46 (GND)	


J104
A
B
J106
J701-1
J701-11
J701-2
J39-2
J701-3
J39-3
J701-4
J39-4
J701-5
J39-5
J701-6
J39-6
J701-7
J39-7
J701-8
J39-8
J701-9
J601-2
J701-10
J401-1
J401-2
J401-3
J401-4
J401-5
J401-6
J401-7
J401-8
J401-9
J401-10
J401-11
J401-12
J401-13
J401-14
J401-15
J401-16
J401-17
J401-18
J401-19
J401-20
J95
ET62
ET63
ET64
ET65
J708-4
J708-6
ET66
ET67
J35-1
J35-2
J35-3
J713 (J3)
Potential measurememnt PCB
J714 (J4)
J712 (J1)
J711 (J2)
J61-4
J61-6
J61-5
J61-3
J61-2
J61-1
J2-4
J2-2
J2-1
J1-1
J1-5
J1-2
J61
Potential sensor
J34-1
J34-2
J34-3
J34-4
J34-5
ET14
ET9
JR1-7
ET19
J807-2
ET26
J104-1A
J104-2A
J104-3A
J104-4A
J104-5A
J104-6A
J104-7A
J104-8A
J104-9A
J104-10A
J104-1B
J88-6
J706
J708
J701
J702
Potential controller PCB
J707
J36-1
J36-2
J36-3
J36-4
J704
J705
J32-1
J32-2
J32-3
J32-4
J32-5
J32-6
J32-7
J33-1
J33-2
J33-3
J33-4
J33-5
J33-6
J33-7
J105-1
J106-2
J106-3
J106-5
J402
+12 -12 S G
ET6
ET20
J501-2
ET8
J501
Toner concentration sensor PCB
+12
S
G
G
-12
ET6
J402-3
ET8
ET8
ET20

CANON COLOR LASER COPIER REV.1 SEPT. 1989 PRINTED IN JAPAN (IMPRIME AU JAPON)

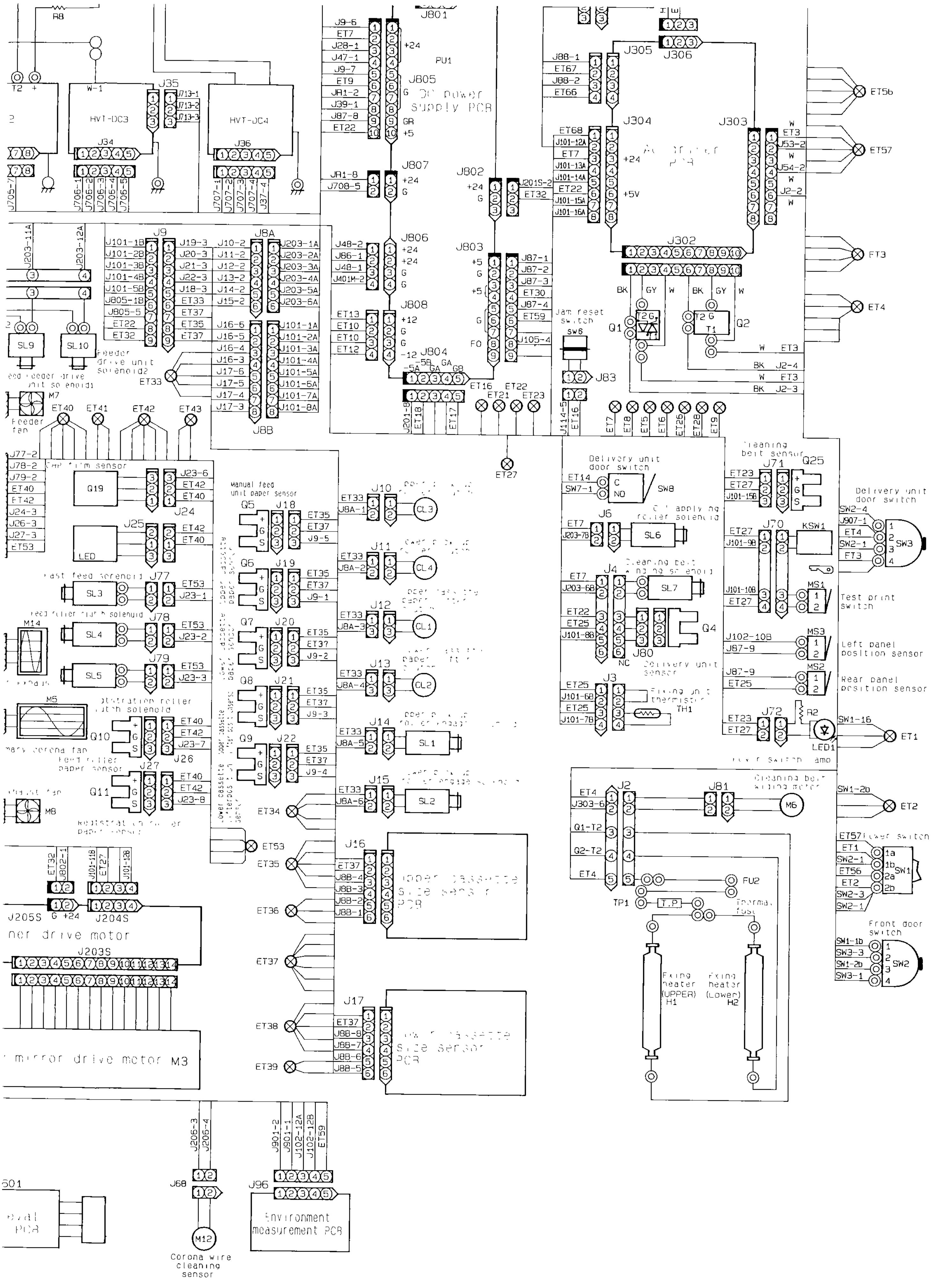

M1
Drum motor
Motor drive PCB
J90
J404M
M2
Main motor
J402M
J401M
+24
G
+5
G
ET58
J806-4
J86-2
ET59
M1M2 G P P G
M3
M11
Cleaning brush motor
Separation claw
Gripper
Transfer drum spacing
Paper guide plate
Cleaning brush
SW5
J48
J75
J47
ET50
SL11
SL12
SL13
SL14
SL15
J203-10B
HVT-DC1
HVT-DC2
J32
J33
R8
T
G
T1
T2
ET30
ET31
ET32
J101
J103
J202
50P
1A
25A
J203
J28
ETS2
SL8
SL9
Fixing roller speed select solenoid
Feeder drive unit solenoid
M7
Feeder fan
ET40
J29
J23
J114
J113
M
C
Y
BK
J206
J204
J207
J208
J209
J210
J201
J205
24
G
5
G
-5
+5
G
-5
J94
M14
Inner exhaust fan
J30
M5
Primary corona
J31
Exhaust fan
M8
J106
J111
J105
J109
J97
Q26
Waste toner sensor
LASER unit
J205S
Scanner dri
J202S
Scanning mirror
J401
J403
Display PCB
J402
+12 -12 S G G +5V
J404
J405
J501
Toner concentration sensor PCB
+12
S
G
G
-12
LA1
J62
Toner concentration sensor LAMP
SL21
J63
Filter select solenoid
CNT1
CNT2
CNT3
CNT4
Total counter
ET48
J66
Q13
Turret home position sensor
NO C
SW7
Front door sensor
J601
+5 S G
Oil level sensor PCB
J36-1
J36-2
J36-3
J36-4

No	ｺﾈｸﾀ
26	ET25
	ET27
	J87-4
	J94-3
	J708-6
	J201-4
27	ET26
	J70-1
	J70-4
	J71-2
	J72-2
	J204S-2
	J209-6
GND)	J601-3
28	JR1-4
	J88-5
	J39-9
+5V)	J39-10
29	ET16
	J84-3
	J84-6
	J85-3
	J85-6
(GND)	J66-2
30	J803-4
	J86-9
(+5V)	ET11
31	Unused
32	J802-2
	J9-9
	J201S-1
(GND)	ET26
33	J9-6
	J10-1
	J11-1
	J12-1
	J13-1
	J14-1
24V	J15-1
T34	Unused

ET No	ｺﾈｸﾀ
ET35	J9-8
	J18-1
	J19-1
	J20-1
	J21-1
(+5V)	J22-1
ET36	Unused
ET37	J9-7
	J9-9
	J16-2
	J17-2
	J18-2
	J19-2
	J20-2
	J21-2
(GND)	J22-2
ET38, ET39	Unused
ET40	J23-4
	J24-1
	J25-1
	J26-1
(+5V)	J27-1
ET41	Unused
ET42	J23-5
	J24-2
	J25-2
	J26-2
(GND)	J27-2
ET43	Unused
ET44	J74-9
	ET45
	J40-1
	J41-1
(+5V)	J42-1
ET45	J74-10
	ET44
	J43-1
	J44-1
(+5V)	J45-1
ET46 (GND)	J74-5

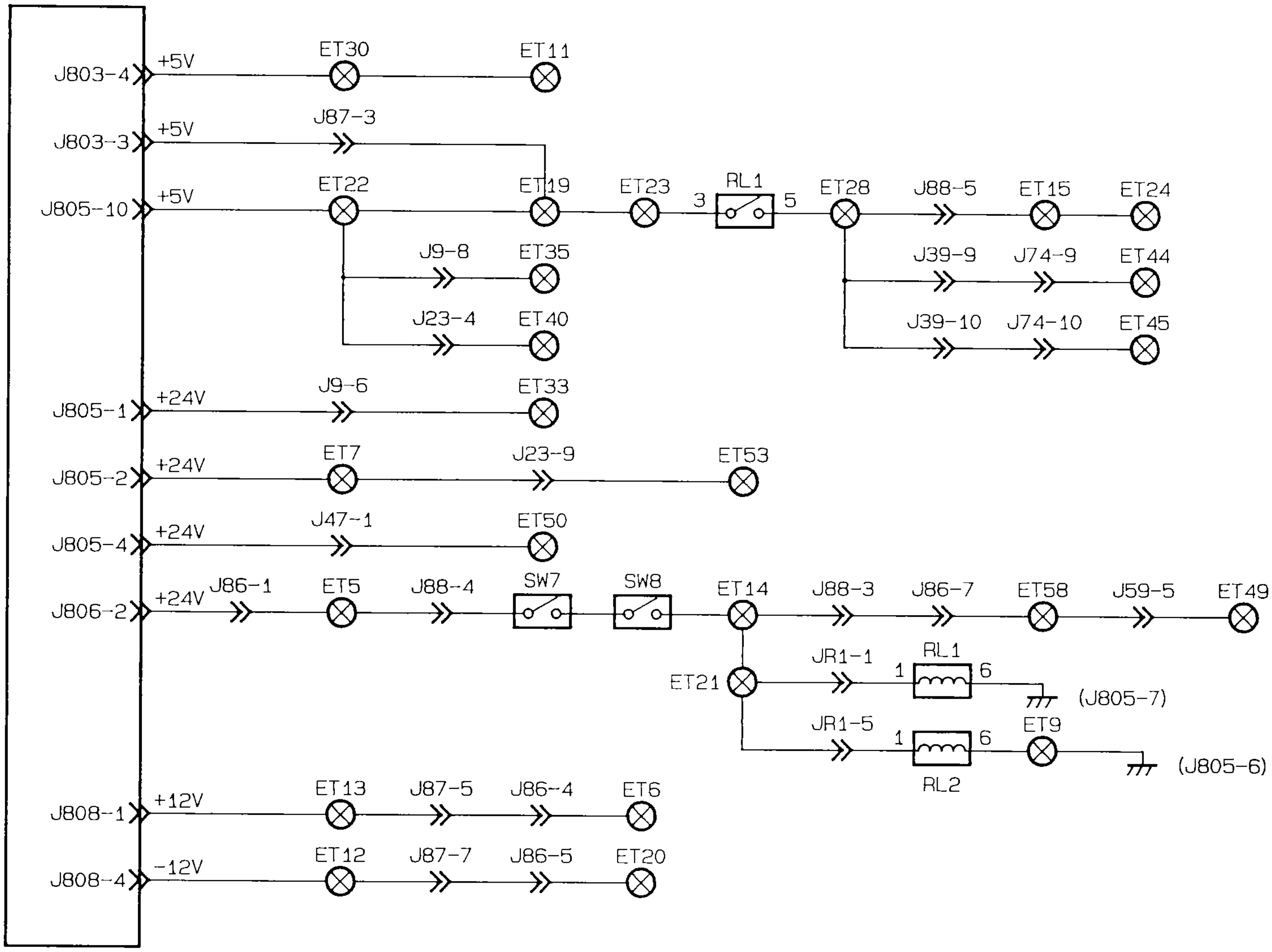
ET No	ｺﾈｸﾀ
ET46	J40-3
	J41-3
	J42-2
ET47	J74-8
	J43-2
	J44-2
(GND)	J45-2
ET48	J65-4
	CNT1
	CNT2
	CNT3
(+24V)	CNT4
ET49	J59-5
	CL5
	CL6
	CL7
(+24V)	CL8
ET50	J47-1
	SL11
	SL12
	SL13
	SL14
(24V)	SL15
ET51, ET52	Unused
ET53	J23-9
	J77-1
	J78-1
(24V)	J79-1
ET54, ET55	Unused
ET56	J1-1
	SW1-2a
	H-3
AC (BK)	J901-1
ET57	J1-2
	SW1-1a
	J306-2
	J902-2
ET58	J86-7
	J401M-1
(24V)	J82-4

ET No	ｺﾈｸﾀ
ET58	J59-5
ET59	J803-6
	J401M-4
	CNB-3
	CNC-2
	J82-2
	J48-5
	J86-3
(GND)	J96-5
ET60	J66-3
	J86-8
	J114-10
	J114-4
ET61	Unused
ET62	J901-5
	J95-1
(+5V)	J105-1
ET63	J901-6
	J95-2
(GND)	J105-6
ET64	J901-3
	J95-3
(+12V)	J105-5
ET65	J901-4
	J95-4
(GND)	J105-2
ET66	J95-3
	J31-3
	J209-1
(+12V)	J305-4
ET67	J95-4
	J209-2
(GND)	J305-2
ET68	J88-7
	J209-5
	J304-1

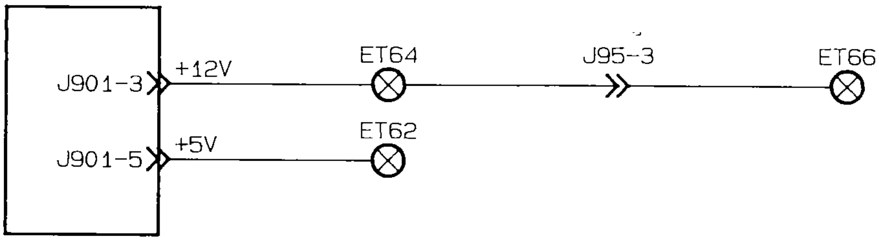


R8
HVT-DC3
HVT-DC4
J34
J35
J36
J801
J805
PU1
DC power supply PCB
J807
J806
J808
J804
J802
J803
J305
J306
J304
J303
J302
AC driver PCB
+24
+5
+5V
G
GA
GB
-12
-5A
-5B
ET56
ET57
ET3
ET4
Q1
Q2
J9
J8A
J8B
SL9
SL10
Feeder drive unit solenoid2
Feed feeder drive unit solenoid1
ET33
M7
Feeder fan
ET40
ET41
ET42
ET43
Jam reset switch
SW6
J83
ET16
ET21
ET22
ET23
ET27
ET7
ET8
ET5
ET6
ET26
ET28
ET9
Q19
LED
J24
J25
Manual feed unit paper sensor
Q5
J18
J10
CL3
Q6
J19
J11
CL4
Q7
J20
J12
CL1
Q8
J21
J13
CL2
Q9
J22
J14
SL1
J15
SL2
Last feed solenoid
J77
SL3
Feed roller clutch solenoid
J78
SL4
M14
J79
SL5
M5
Registration roller clutch solenoid
Q10
J26
Feed roller paper sensor
Q11
J27
M8
Exhaust fan
Registration roller paper sensor
ET34
ET53
ET35
ET36
ET37
ET38
ET39
J16
Upper cassette size sensor PCB
J17
Lower cassette size sensor PCB
Delivery unit door switch
SW8
J6
SL6
J4
Cleaning belt winding solenoid
SL7
Q4
J80
Delivery unit sensor
J3
Fixing unit thermistor
TH1
Cleaning belt sensor
J71
Q25
J70
KSW1
Delivery unit door switch
SW3
MS1
Test print switch
MS3
Left panel position sensor
MS2
Rear panel position sensor
J72
R2
LED1
ET1
J2
J81
Cleaning belt winding motor
M6
ET2
Power switch
SW1
FU2
TP1
T.P
Thermal fuse
Fixing heater (UPPER) H1
Fixing heater (Lower) H2
Front door switch
SW2
J205S
J204S
Scanner drive motor
J203S
Mirror drive motor M3
J68
M12
Corona wire cleaning sensor
J96
Environment measurement PCB
J601
Removal PCB

DC power supply PCB (PU1)

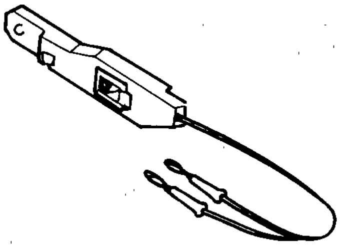
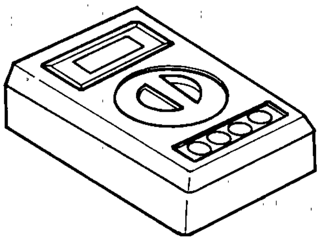
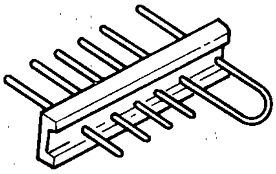
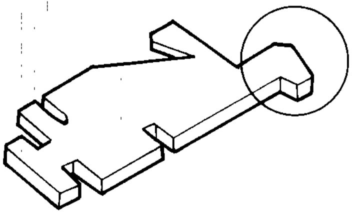
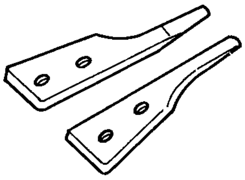
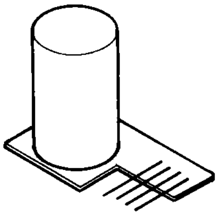

J803-4
+5V
ET30
ET11
J803-3
+5V
J87-3
J805-10
+5V
ET22
ET19
ET23
RL1
3
5
ET28
J88-5
ET15
ET24
J9-8
ET35
J39-9
J74-9
ET44
J23-4
ET40
J39-10
J74-10
ET45
J805-1
+24V
J9-6
ET33
J805-2
+24V
ET7
J23-9
ET53
J805-4
+24V
J47-1
ET50
J806-2
+24V
J86-1
ET5
J88-4
SW7
SW8
ET14
J88-3
J86-7
ET58
J59-5
ET49
ET21
JR1-1
RL1
1
6
(J805-7)
JR1-5
1
6
ET9
RL2
(J805-6)
J808-1
+12V
ET13
J87-5
J86-4
ET6
J808-4
-12V
ET12
J87-7
J86-5
ET20

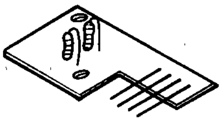
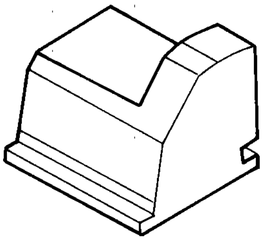
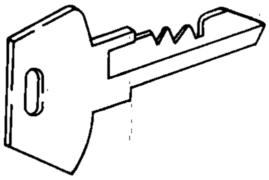
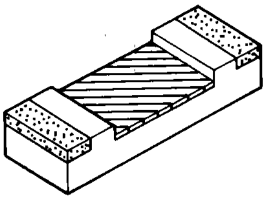
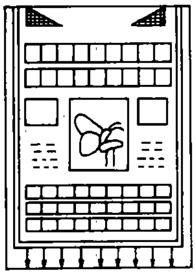
DC power supply PCB (PU2)


J901-3
+12V
ET64
J95-3
ET66
J901-5
+5V
ET62

S. LIST OF SPECIAL TOOLS

The following special tools are required in addition to the standard tool set for servicing the machine.

No.	Description	Tool No.	Appearance	Rank	Use/Remarks
1	Laser power tester	TNK-0198		A	For adjusting the laser intensity of the laser unit. Use digital multimeter CK-0436 with the checker. Calibrate the checker once a year.
2	Digital multimeter	CK-0436		A	For electrical checks. The multimeter is used with the laser power checker to adjust the laser intensity of the laser unit.
3	Laser unit jumper connector	TKN-0406		B	For safety. The jumper prevents the laser diode from being destroyed by static electricity.
4	Door switch actuator	TKN-0093	Use this tab. 	A	
5	Replacement blade for stop ring pliers	CK-0426		B	For removing grip rings. (4 to 9 mm)
6	Environment sensor calibration PCB	TKN-0456		B	For checking the environment sensor.

No.	Description	Tool No.	Appearance	Rank	Use/Remarks
7	Environment measurig PCB test tool	TKN-0457		B	For checking the environment measuring PCB.
8	Gripper opening tool	TKN-0458		A	For replacing the transfer drum sheet.
9	Control key	CK-0423			Accessory
10	Electrode for checking the drum surface potential sensor	TKN-0197		B	For checking the zero level of the drum surface potential sensor.
11	CA1 test sheet	FY9-9030-000		A	For adjusting/checking the image.

Information: Rank
A: One tool for each serviceman.
B: One tool for every five servicemen.
C: One tool for each workshop.

T. SOLVENT AND MATERIAL LIST

No.	Material name	Use	Chemical formula, mixture ratio, etc.	Source	Remarks
1.	Ethyl alcohol (Ethanol) Isopropyl alcohol (Isopropanol)	Cleaning: copyboard, glass, mirror, etc.	C_2H_5OH $(CH_3)_2CHOH$	Locally	Take care in handling. All are flammable. Use in a well-ventilated area. Avoid breathing vapor.
2.	MEK	Removing toner or oil stains	CH_3-CO-C_2H_5 Methylethy ketone	Locally	Do not use for cleaning the drum, plastic molded parts, or corona wires. Use in a well-ventilated area and avoid breathing vapor. Avoid contact with eyes or with skin.
3.	Heat-resistant grease	Lubricating the drive mechanisms, e.g. copyboard driving gear, fixing drive gear, fixing ass'y, etc.		CANON	Tool No.: CK-0427 (500g can) (Equivalent grease can be used, but should be able to withstand 200°C for extended periods of time.)
4.	Lubricating oil	Lubrication points	ISO VG 68 oil ESSO Feibs K68 MOBIL Vactra oil No.2 SHELL Tonna oil T68	Locally	Equivalent oil can be used. Tool No. CK-0451 (100cc)
5.	Flanned cotton cloth	Cleaning and other parts		Local	It should be soft enough for cleaning the drum, and it should not produce lint.
6.	Lint-free paper	Cleaning	Kimberly-Clark Kim wipes 6020-23 × 40 cm, or 6021-13 × 21 cm	Locally	It should be soft enough for cleaning the drum, and it should not produce lint.

Note:
Solvents listed are not toxic, but they may produce minor, temporary effects if breathed in high concentration, or if they contact the skin for period of time. Any effects are temporary, but exercise reasonable caution nevertheless.

COLOR LASER COPIER
FILM PROJECTOR

SERVICE
MANUAL

I. SPECIFICATIONS

1. Projector	
Type	Stationary
Projection system	Projector
2. Projection lens	95 mm, f/2.8
3. Lamp	Tungsten-halogen 36 V, 400 W
4. Projection size	A5 (on copyboard glass surface)
5. Film types	Negative and positive
6. Film size	
1) Standard screen	24 × 36 mm
2) Copy area	23 × 34 mm (standard)
7. Copy are displacement	
Top and bottom	0 to 1.8 mm
Right and left	0 to 1.8 mm

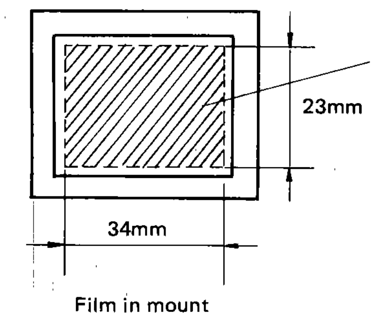

23mm
34mm
Film in mount

Figure 1-1

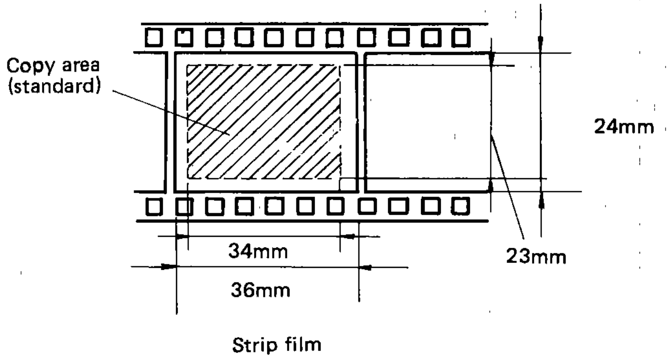

Copy area
(standard)
24mm
34mm
36mm
23mm
Strip film

Figure 1-2

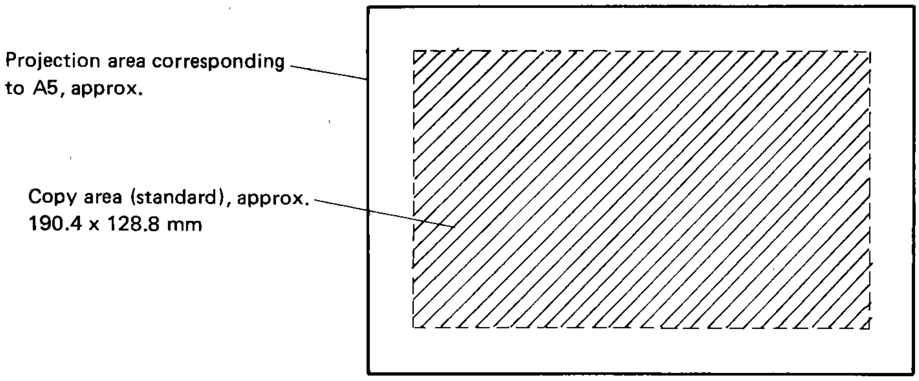

Projection area corresponding
to A5, approx.
Copy area (standard), approx.
190.4 x 128.8 mm

Figure 1-3 Image projected on copyboard glass

8. Projection reproduction ratio
   5.6 times
9. Dimensions
   1) Projector
      371(H) × 340(W) × 450(D) mm
   2) Mirror unit (closed)
      35(H) × 332(W) × 223(D) mm
10. Weight
    Projector
    8 kg (including power supply)
    Mirror unit
    2.3 kg
11. Power
    115V 60Hz
    220V 50Hz
    240V 50Hz
12. Maximum power consumption
    0.55kW (Maximum)

Information in this manual is subject to change with improvement or redesign of the projector.

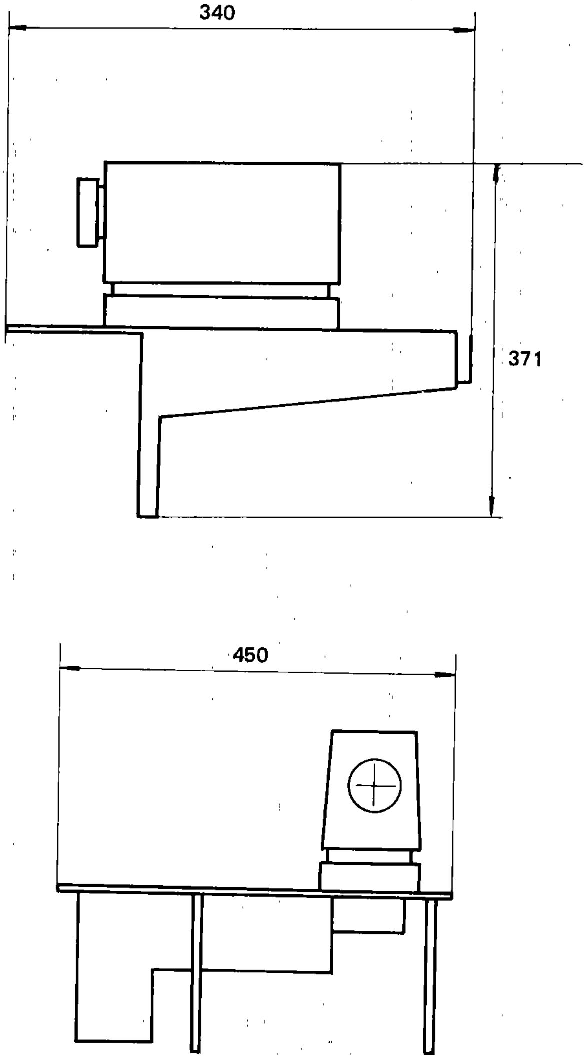


Figure 1-4

II. PART NAMES

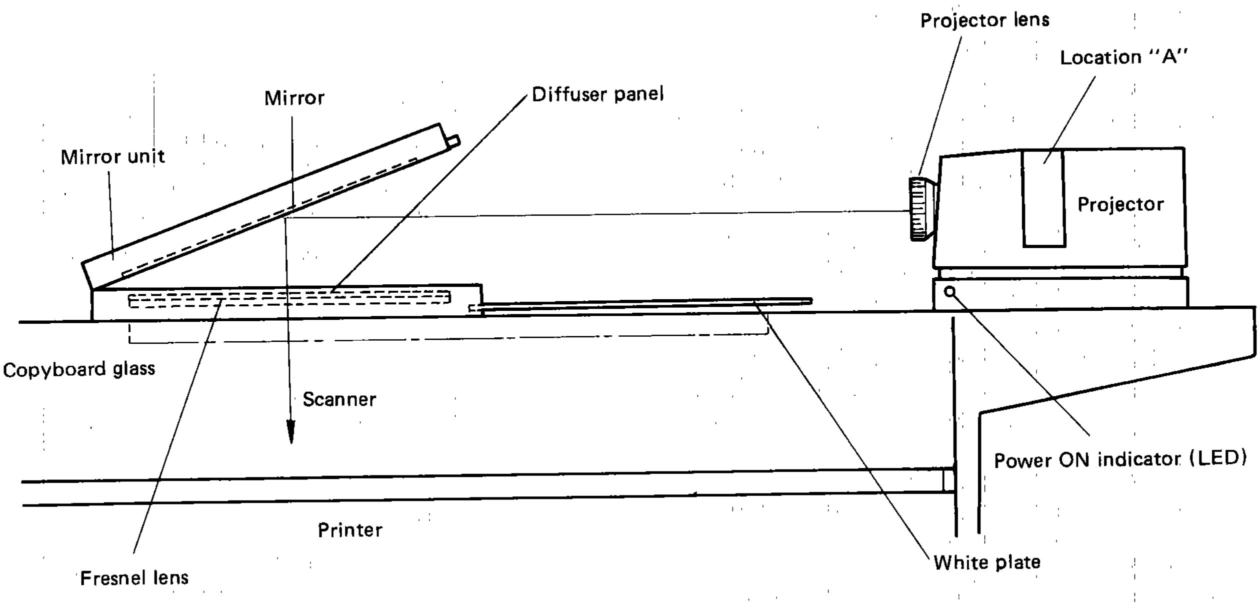

Projector lens
Location "A"
Mirror
Diffuser panel
Mirror unit
Projector
Copyboard glass
Scanner
Power ON indicator (LED)
Printer
Fresnel lens
White plate

Figure 1-5

Parts for use in location "A" of projector

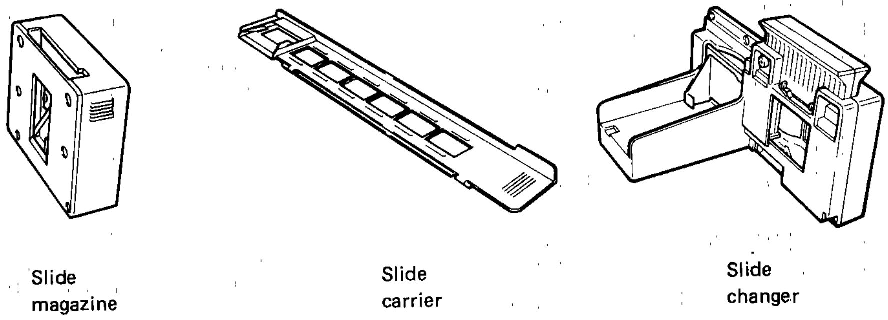

Slide magazine
Slide carrier
Slide changer

Figure 1-6

III. OPERATION

A. Copying Procedure: Positive Film

1) Press the PROJECTOR key on the Image Scanner control panel.
   - The display screen will appear as in Figure 1-7 to indicate that Projector mode has been selected. Follow the instructions on the screen.
2) Press (POS) (OK). Wait until the display screen appears as in Figure 1-8.
3) Press the (SHADING) key.
   - Shading compensation will be performed, then the display will appear as in Figure 1-9.
4) Put the film to be copied in the projector using the changer, then press the (FOCUS) key.
   - The projector will go ON.
5) Adjust the focus on the diffuser panel of mirror unit by rotating the lens.
6) Press the (FIX) key.
   - The display screen will return to normal.
7) Press the COPY START key.
   - The film will be copied.

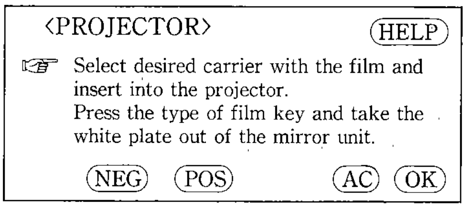
B. Copying Procedure: Negative Film

1) Press the PROJECTOR key on the Image Scanner control panel.
   - The display screen will appear as in Figure 1-7 to indicate that projector mode has been selected. Follow the instructions on the screen.
2) Press (NEG) (OK).
   - The display screen will appear as in Figure 1-10.
3) Select base film according to the film brand and ISO speed. Put the film in the projector using the carrier and press the (SHADING) key.

   Note:
   Base film for three major brands having ISO 100 film speed are packed with the projector. For other brands and film speeds, use the unexposed strip from the exposed roll to make base films and to do(SHADING.)

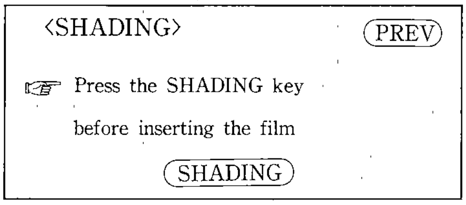
   - Shading compensation will be performed, then the display will appear as in Figure 1-11.
4) Put the film to be copied in the projector using the carrier, then press the (FOCUS) key.
   - The projector lamp will go ON.
5) Adjust the focus on the diffuser panel of mirror unit by rotating the lens.
6) Press the (FIX) key.
   - The display screen will return to normal.
7) Press the COPY START key.
   - The film will be copied.

Note:
If the copy made has red or blue tint, select projector mode again and press the (COLOR TONE) key shown in Figure 1-9, 1-11. The display screen will appear as in Figure 1-12. Press the (←) (→) keys to adjust color tone.


<PROJECTOR> (HELP)

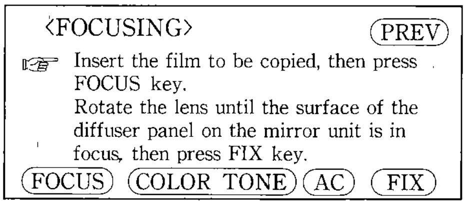
☞ Select desired carrier with the film and insert into the projector.
Press the type of film key and take the white plate out of the mirror unit.

Figure 1-7


<SHADING> (PREV)

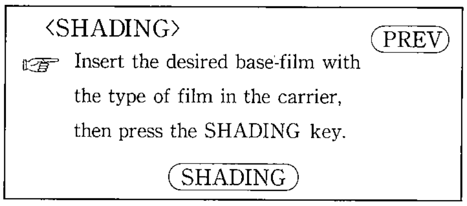
☞ Press the SHADING key before inserting the film

Figure 1-8


<FOCUSING> (PREV)

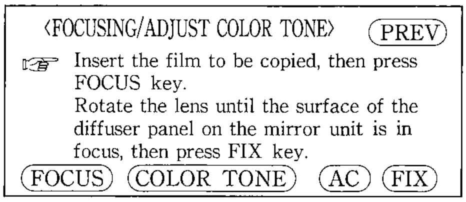
☞ Insert the film to be copied, then press FOCUS key.
Rotate the lens until the surface of the diffuser panel on the mirror unit is in focus, then press FIX key.

Figure 1-9


<SHADING> (PREV)

☞ Insert the desired base-film with the type of film in the carrier, then press the SHADING key.

Figure 1-10


<FOCUSING/ADJUST COLOR TONE> (PREV)

☞ Insert the film to be copied, then press FOCUS key.
Rotate the lens until the surface of the diffuser panel on the mirror unit is in focus, then press FIX key.

Figure 1-11

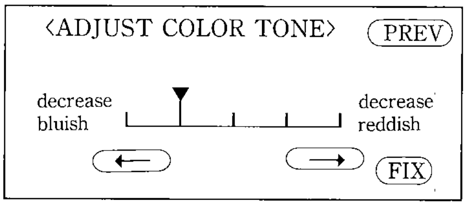

<ADJUST COLOR TONE> (PREV)

Figure 1-12

IV. CUSTOMER INSPECTIONS

A. Cleaning

It should be carefully explained to the customer that the following parts should be cleaned whenever necessary.

1. Projection lens

Remove loose dust using a blower brush. For fingerprints and other marks that can not be brushed off, use lens cleaning tissue, other soft lint-free paper, or soft cloth slightly moistened with alcohol or lens cleaning fluid. (Never put liquid directly on the lens, for it can seep inside and cause problems.)

2. Mirror

Clean the mirror with a blower brush.

If this is not sufficient (fingerprints, etc.) wipe it gently with lint-free paper moistened with alcohol. Be careful not to scratch the mirror.

3. Fresnel lens (both sides)

Clean with a blower brush. If dirt still does not come off, wipe lightly with lint-free paper or a cloth moistened with alcohol. Do not rub the sides of the lens strongly at that can damage the fresnel lens surface and result in appearance of scratches on the copies made.

4. Projection lamp

When the lamp requires replacement, ask the customer to follow the procedure given in Chapter 3.

I. PRINCIPLES OF OPERATION

The light beam from the projector (having passing through the film) is reflected by the mirror of the mirror unit (on the copyboard glass) and passes through the fresnel lens (also of the mirror unit) which focuses the image on the ground (frosted) surface on the other surface of the lens. The image then is in the same plane as a sheet of paper on the copyboard, and the copier can copy it in the same way as it would a paper document.

II. COMMUNICATION WITH THE SCANNER

Signals are transmitted between the reader (Image Scanner) and projector on four lines. Figure 2-1 and Table 2-2 give the signal names and meanings.

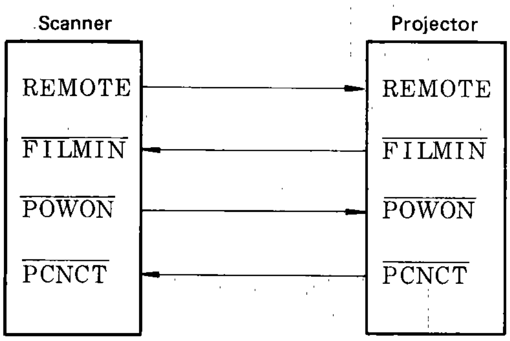

Scanner
Projector
REMOTE
$\overline{\text{FILMIN}}$
$\overline{\text{POWON}}$
$\overline{\text{PCNCT}}$
REMOTE
$\overline{\text{FILMIN}}$
$\overline{\text{POWON}}$
$\overline{\text{PCNCT}}$

Figure 2-1

Signal name		Meaning/function
Image scanner unit ↓ Projector	$\overline{\text{REMOTE}}$	The output is an analog voltage signal indicating the projector lamp operating voltage for optimum lamp intensity (determined by scanner preliminary scan). The signal also controls operation of the projector fan.
	$\overline{\text{POWON}}$	The output is "0" when scanner is in projector mode.
Projector ↓ Image scanner unit	$\overline{\text{FILMIN}}$	The output is "0" when the slide carrier is in the slide magazine or when the slide changer is cycling (changing from one slide to another).
	$\overline{\text{PCNCT}}$	The output is "0" when the scanner and projector are connected.

Figure 2-2

III. DESCRIPTION OF ELECTRICAL CIRCUITS

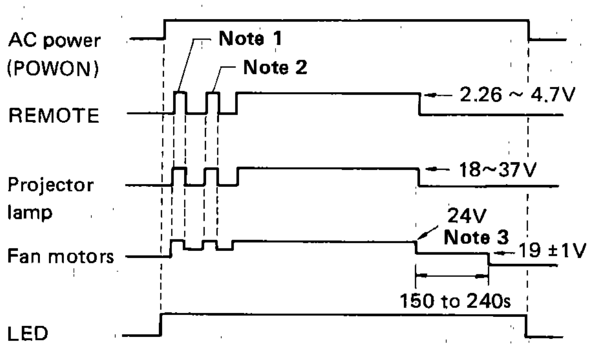
Electrical operations of the projector are controlled by signals from the scanner.

When the reader (Image Scanner) select projector mode, the reader sets POWON to "0" which actuates relay RL1 (ON). This supplies AC power to the projector (the power supply LED lights as confirmation).

Microswitch MSW1 is actuated ON when the slide magazine is positioned in the projector and the slide carrier is in it, or when the slide changer is in the projector and in the position to project a slide. Actuating MSW1 generates a FILMIN "0" signal that indicates to the scanner that film is present.

The cover switch (SW2) goes OFF when the projector lamp access cover is opened. When SW2 goes OFF, power to the lamp (LA1) is immediately switched OFF regardless of the REMOTE signal.

Figure 2-3 shows the timing chart of outputs of various voltages in response to the scanner REMOTE signal. Automatic density adjustment is performed to determine the projector lamp drive voltage that will power the lamp to the intensity that will give the correct drum surface potential, and the appropriate REMOTE signal (analog) is sent from the reader to the projector. This REMOTE signal both switches the projector lamp ON/OFF and sets the lamp drive voltage (produced by the switching power supply). It also switches fan/motors units FM1 and FM2 ON/OFF. When the REMOTE signal is ON, the fans begin to run. When the REMOTE signal goes OFF, the fans continue to run for about three minutes at 19 V (usually 24 V) to cool the projector lamp.



Note 1: REMOTE signal (analog) during shading compensation.

Note 2: REMOTE signal (analog) during automatic density adjustment.

Note 3: Fan motor voltage after REMOTE signal goes OFF (19 V)

Figure 2-3

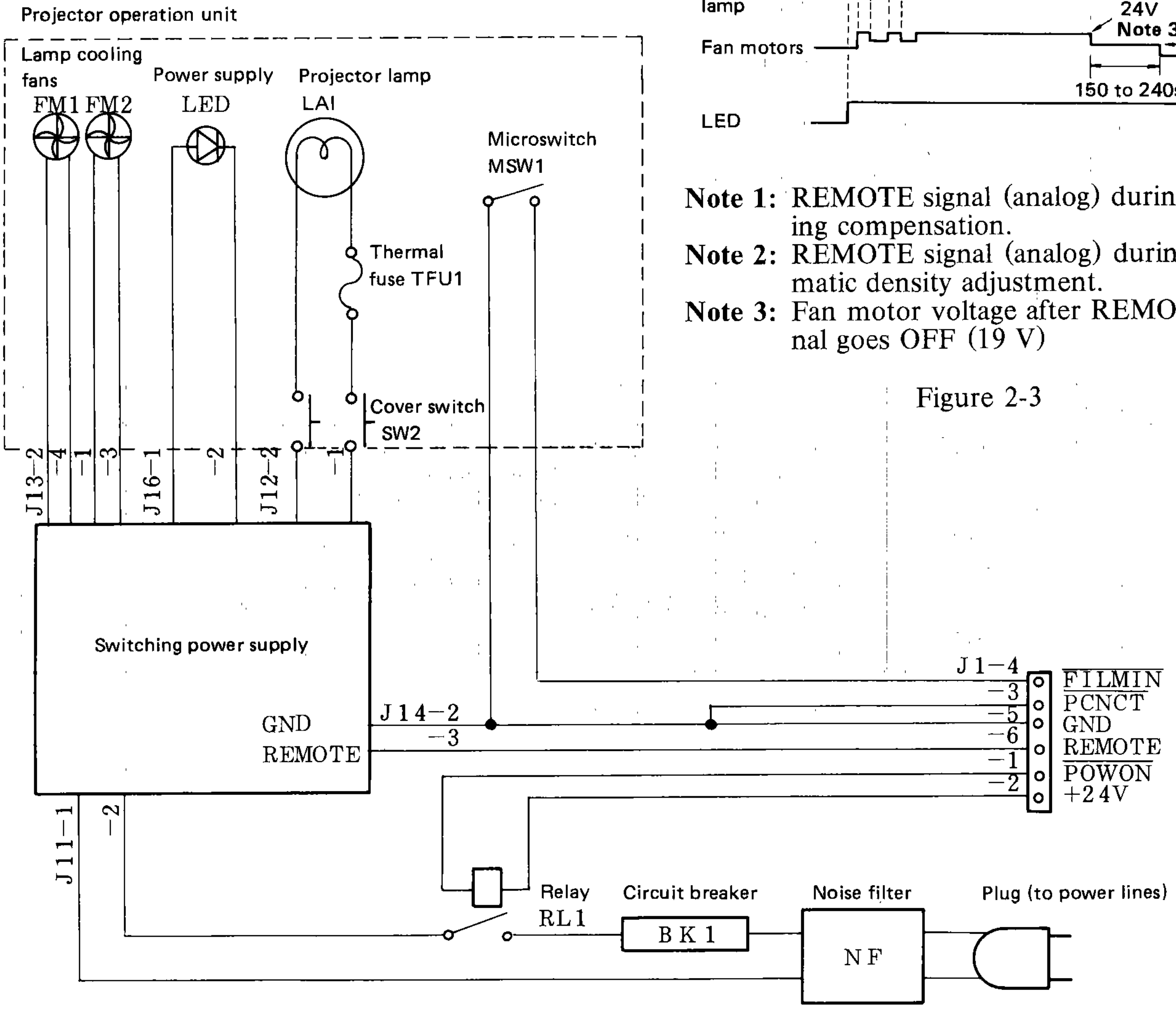
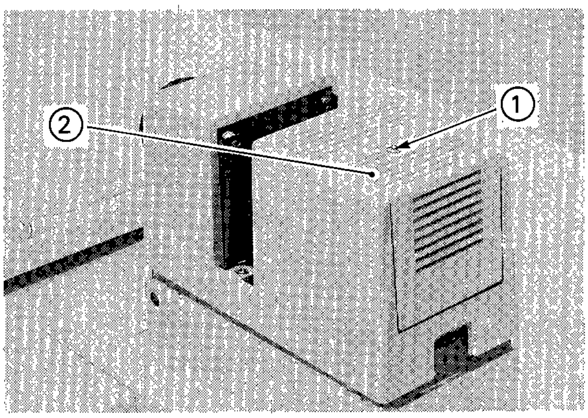

Projector operation unit
Lamp cooling fans
FM1 FM2
Power supply LED
Projector lamp LA1
Microswitch MSW1
Thermal fuse TFU1
Cover switch SW2
J13-2
-4
-1
-3
J16-1
-2
J12-2
-1
Switching power supply
GND
REMOTE
J14-2
-3
J1-4
-3
-5
-6
-1
-2
FILMIN
PCNCT
GND
REMOTE
POWON
+24V
J11-1
-2
Relay RL1
Circuit breaker
BK1
Noise filter
NF
Plug (to power lines)

Figure 2-4

I. OPTICAL SYSTEM

A. Replacing the Projection Lamp

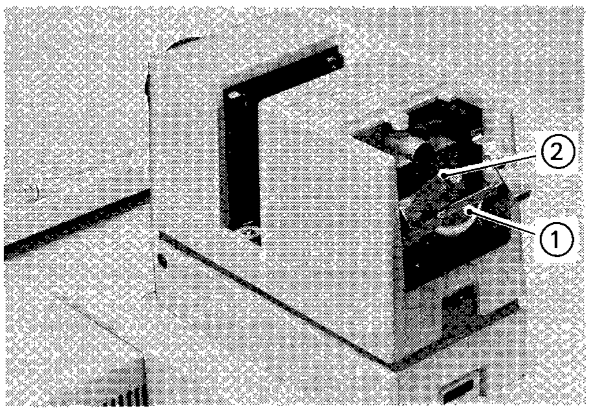
1) Switch the Image Scanner unit OFF and unplug its power cord.
2) Remove the screw of the lamp cover.



① Screw
② Lamp cover

Figure 3-1

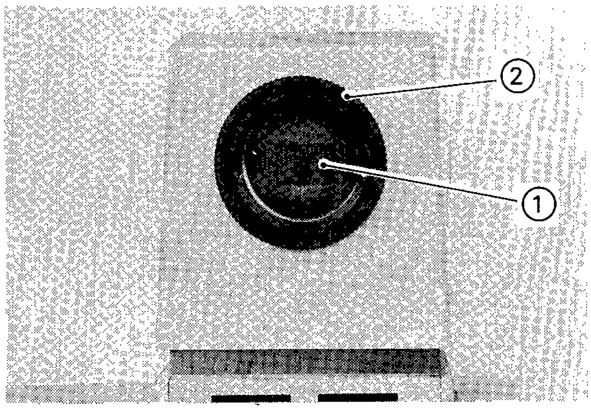
3) Remove the screw and open the lamp door.
4) Wait until the lamp is cool, then open the reflector.



① Reflector ② Lamp

Figure 3-2

5) Pull out the old lamp.
6) Pull the pins of the new lamp out of the plastic bag. Keep the lamp in the bag while handling it in order to avoid getting fingerprints on the lamp. (Fingerprints or other oils wil damage the lamp when it heats up.)
7) Insert the pins of the new lamp in the socket. Make sure the lamp is inserted fully, and check that it is not leaning to one side.
8) Close the reflector and door.
9) Look through the projection at the filament. If the filament is not centered in the lens, open the door and reflector and move the lamp as required, then check again. (Hold the lamp with clean paper, cloth, or plastic, not bare fingers.)



① Projection lamp filament
② Projection lens

Figure 3-3

Note:
Look straight into the lens, as shown in Figure 3-4. This may require some practice.

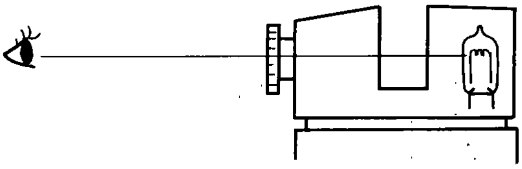


Figure 3-4 Line of sight to filament is horizontal

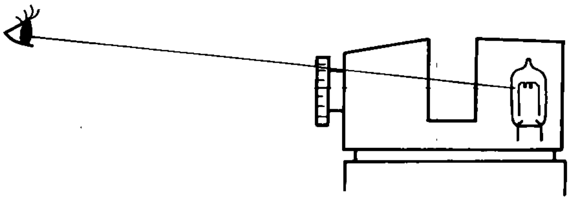


Figure 3-5 Line of sight to filament is not horizontal

I. PARTS TO BE REPLACED PERIODICALLY

There are no parts in the projector which have to be replaced periodically.

II. EXPECTED SERVICE LIVES OF CONSUMABLES

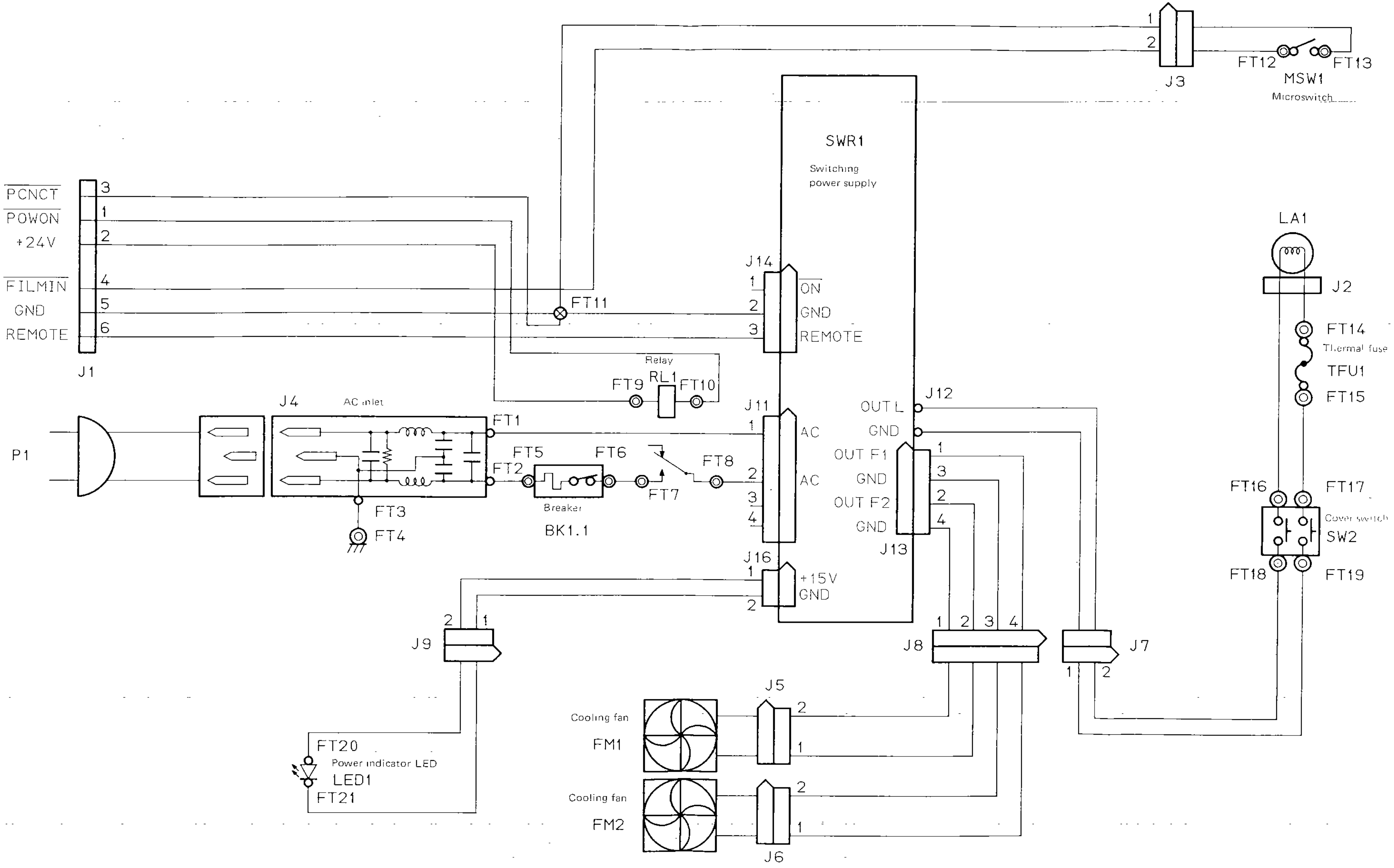
The parts listed below may require replacement during the warranty period, but are to be replaced only if they are faulty or worn. The expected service lives of these parts are as follows.

No.	Description	Part No.	Q'ty	Service life (Number of copies)	Remarks
1	Tungsten-halogen lamp (scanner lamp)	FH7-3102-000	1	20,000	*
2	Base-density sample film (Fuji)	FF1-9046-000	1	10,000	*
3	Base-density sample film (Kodak)	FF1-9047-000	1	10,000	*
4	Base-density sample film (Konishiroku)	FF1-9048-000	1	10,000	*

Note:
Numbers indicated in the table are estimates only, and are subject to change.

* Numbers indicated here are estimates for copies using the projector mode. Number of copies made so far in the projector mode can be verified by putting the copier into SERVICE mode and pressing (5 COUNTER).

A. FILM PROJECTOR GENERAL CIRCUIT DIAGRAM



J3
1
2
FT12
FT13
MSW1
Microswitch
SWR1
Switching power supply
LA1
J2
FT14
Thermal fuse
TFU1
FT15
PCNCT
POWON
+24V
FILMIN
GND
REMOTE
J1
3
1
2
4
5
6
FT11
J14
ON
GND
REMOTE
Relay
RL1
FT9
FT10
J11
AC
AC
J12
OUT L
GND
OUT F1
GND
OUT F2
GND
J13
P1
J4
AC inlet
FT1
FT2
FT3
FT4
FT5
FT6
FT7
FT8
Breaker
BK1.1
FT16
FT17
Cover switch
SW2
FT18
FT19
J16
+15V
GND
J9
J8
J7
J5
J6
Cooling fan
FM1
Cooling fan
FM2
FT20
Power indicator LED
LED1
FT21